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No. 1.

NOTES ON THE DISTRIBUTION OF AND CERTAIN CHARACTERS IN THE SAXIDOMI OF THE WEST COAST.

BY ROBT. E. C. STEARNS.

Four species of *Saxidomus* have been described from the West coast of North America and one from Japan. On the American shores its distribution extends from the Gulf of Alaska to San Diego, a range of about 2500 miles. It is remarkably prolific, being found in great abundance in the waters of Puget Sound and in many places between the points above named.

The foregoing applies particularly to the two species *S. aratus* Gould (= *S. gracilis* Gld.), and *S. Nuttallii* Conrad. The other forms, *S. squalidus* Desh., and *S. brevisiphonatus* Cpr., may prove to be only varietal. With our present knowledge, the latter appear to be quite local, or of infrequent occurrence, apparently restricted to Vancouver Island and the shores around the Strait of Juan de Fuca, though Carpenter credits *squalidus* to Oregon and the neighborhood of San Francisco bay. *S. Nuttallii* appears to be more generally distributed and more abundant throughout the region named than *S. aratus*, though in one instance as many as a hundred bushels of the latter were included in a single consignment in 1867 to a San Francisco commission merchant. Notwithstanding its superior quality from an edible point of view, there was no sale for them; it was not a familiar form and the greater part was dumped into the bay.

These were obtained from some point on the shore of Soloma county in the neighborhood of Bodega, the exact locality unknown.

The Indians, Wintuns and Pomos, who formerly inhabited the general region bordering this part of the coast, collected and dried great quantities of the meats of this species, which formed an important part of their food supply, and they also made their disk-shaped beads and money, *hawock*, out of the shells.

Harford's¹ Alaska collection contained examples of *S. Nuttallii*, from Kodiak Island, Sitka, Carter's Bay, and Port Simpson. Dall's voluminous Alaskan notes when published will, probably, show that it is generally distributed throughout the Alaskan region. At San Pedro in the south, it occurs in gravelly mud and sand, associated with *Tapes lucinata*, a sharply sculptured species belonging to a genus that like *Saxidomus* is without a representative on the Atlantic coast. *S. Nuttallii* is ordinarily a much coarser sculptured shell than *S. aratus*, and as would be inferred when its wide distribution and great abundance are considered, varies greatly in proportion of length to breadth and both of these to thickness. The sculpture varies according to the local character of the ground it inhabits.

There are other features worthy of notice; among these the hinge cartilage, etc., and the adductors, the mechanism by which the valves are opened and closed, which is exceedingly conspicuous in *Saxidomus* as compared with *Tivela crassatelloides*, as will be seen at a glance when individuals of the two forms, of the same size, are placed side by side.

Following Dall's analysis of the so-called cartilage,² which he says "is not a cartilage, and which is frequently spoken of as 'ligament,' or 'internal ligament,' [there is] a great need of a distinctive name, and I propose that of 'resilium,' which clearly indicates its function;" the term ligament being used for the upper or external portion or member, which operates *by pulling*, while the resilium or inner portion may be said to operate by causing a *rebound* when pressed, so *resisting the closing of the valves* when they are open; thus these two parts or members act reciprocally, each assisting in its special way in opening the valves. The function of the adductor

¹ Shells collected by the U. S. Coast Survey Expedition to Alaska in the year 1867; Proc. Cal. Acad., Dec. 2, 1867.

² Trans. Wagner Free Institute of Science, Vol. 3, Part III, March, 1895.

muscles is, on the contrary, that of *closing the valves*, and the position of these as related to the position of the compound ligament facilitates exactness in the inter-locking of the hinge teeth. Now these organs or devices for opening and closing the shells are of exceeding prominence in *S. Nuttalli*, and the opportunity for examining a fine series has recently been afforded me, by the gift of a large number for culinary purposes,¹ by Mr. and Mrs. Oldroyd.

The adductors are exceedingly large for shells of the size and weight, and the ligament being in proportionate size to these muscles, makes this form particularly desirable for the study of these characters. When alive and gaping, the least disturbance will be followed by an energetic closing of the shell, with a snap so vigorous as to cause a chipping or fracture of the vertical edges of the valves. The strength and tenacity of the grip, when the powerful adductors are brought into action, may be easily proven by the insertion of the finger-tips into a partially open shell.

The texture or substance of the shells in the *Saxidomus* is less compact or solid than in *Tivela crassatelloides*, and the comparative weight of examples of the same dimensions is as 10 to 13; while the mass of the adductors and ligaments are fully twice as large in *Saxidomus* as in *Tivela*, examples of the same size being compared.

The differences exhibited by these forms, both belonging to the *Veneridæ*, indicate differences in habits and environmental conditions, and no doubt others not readily perceived.

A NEW SPECIES OF SISTRUM.

BY HENRY A. PILSBRY.

***Sistrum nicocheanum*, n. sp.**

Shell imperforate or rimate, fusiform, thick and strong, brownish flesh-colored, the spiral liræ brown. Sculpture of strong, rounded, longitudinal waves equal to their intervals, 8 or 7 in number on the last whorl; these waves crossed by rather strong spiral cords, which widen into transversely oblong low tubercles upon the summits of the waves. Between these cords there are several spiral threads in most or all of the intervals. Whorls about $5\frac{1}{2}$, convex, the last one with concave outlines below, produced in a rather long anterior

¹ This "clam" makes an exceedingly delicious soup or broth.

canal. Aperture oval, flesh-colored within; peristome thick or beveled, armed with six subequal teeth within; columellar margin angular at the origin of the anterior canal, bearing a single small transverse fold above the angle; canal rather straight and long for this genus.

Length $21\frac{1}{2}$, diam. 11, length of aperture and canal 12 mm.

Nicochea, Argentina, Dr. H. von Ihering. Types no. 72640 coll. A. N. S. P.

This species is no. 877 of Dr. von Ihering's register. It has much the general appearance of *Urosalpinx cinereus* (Say), which has about the same contour. The common Antillean *Sistrum nodulosum* is more abbreviated, with far stronger tuberculation and a short anterior canal. It extends southward to Rio Janeiro and Cabo Frio, Brazil (Cf. Hidalgo, Mol. Viaje al Pacifico, p. 67, as *R. tuberculata* Blv. var.?).

A NEW GUATEMALAN GLANDINA.

BY HENRY A. PILSBRY.

Glandina Iheringi n. sp.

Shell obesely fusiform or biconic, the diameter half the altitude; pale brown, with occasional dark chestnut or purplish-brown variceal stripes, inconspicuously bordered on the left side with whitish. Surface shining, *finely and evenly striated throughout*, excepting the smooth apical whorls; spire conic, with nearly straight lateral outlines, the apex rather acute. Whorls $7\frac{1}{3}$, a little convex, the earlier $2\frac{1}{2}$ smooth, separated by a simple suture, the rest very *distinctly margined below the suture by an impressed line which defines a narrow band of bead-like tubercles*. Last whorl obese, its latter half not rapidly descending, the last suture being consequently nearly parallel with the others, in a dorsal view. Aperture somewhat over half the shell's length, narrow; *outer lip regularly arcuate*; columella subvertical, concave above, then sinuous and abruptly truncated and excised. Alt. 25, diam. $12\frac{1}{2}$; longest axis of aperture $14\frac{1}{2}$, greatest width $5\frac{2}{3}$ mm.

Alta Vera Paz, Guatemala. Type no. 78036 Mus. Acad. Nat. Sci. (no. 413 of Dr. H. von Ihering's register).

This elegantly marked species is somewhat allied to *G. cordovana*

and *G. speciosa*, both of which, on comparison of specimens, are seen to be much more cylindrical. The latter differs in being decidedly smoother below, even glabrous, while *G. Iheringi* is striated to the base. The body-whorl is strongly swollen and convex, and the narrow moniliferous subsutural border is particularly distinct and elegant.

NEW PISIDIA, AND SOME GENERAL NOTES.

BY DR. V. STERKI.

PIS. IMBECILLE n. sp. Mussel minute, ovoid-oblong in outline, rather inflated; superior and inferior margins moderately curved, posterior slightly truncated obliquely outward, rounded below, antero-superior slightly curved or almost straight (oblique), anterior end rounded; beaks somewhat posterior, broad and low, slightly raised above the hinge margin in the adult; color pale yellowish horn to whitish; surface with very fine striation and a few slightly marked lines of growth, and with a slight waxy gloss; shell thin, hinge very fine and plate quite narrow; cardinal teeth very small, thin, or almost obsolete, lateral teeth small, the outer ones of the right valve scarcely visible; ligament fine.

Size: long. 2.3, alt. 1.8, diam. 1.3 mill.

Habitat: Byer's Trout Pond, and Button Lake, Kent Co., Mich., collected by Dr. R. J. Kirkland.

This is a well characterized species, not nearly related with any other, and can not be mistaken for mature specimens of any one. But it has much resemblance with very young examples of *Pis. variable* Pr., of the same size, and it takes good care to discern them.—Our species will doubtless be found in other places; in Byer's Pond Dr. K. collected over four hundred specimens, and twenty-five in Button Lake. The name has been derived from its small size, thin shell, low, broad beaks, and some similarity in shape with *Anodonta imbecillis* Say.

Pis. peraltum, n. sp. Mussel of moderate size, somewhat oblique, very high, much inflated, beaks large, full and prominent; hinge margin strongly curved; posterior part, behind the beaks, very short, the margin high, slightly to distinctly truncated, passing into the well rounded inferior, with a wide, regular curve; antero-superior

margin slightly curved in a steep slope to the slightly angular, rounded anterior end; color light yellowish horn in the young and a zone along the margins in older species, in which the upper parts usually are grayish; surface slightly shining, finely and irregularly striated, with some deeper lines of growth usually of darker color; shell rather strong, nacre whitish to grayish, muscle insertions distinct; hinge stout, strongly curved, plate moderately broad; cardinal teeth short, the one in the right valve curved, its posterior part thick, and usually grooved; the anterior of the left valve short, stout, triangular, abrupt, with a deep groove, posterior short, oblique, curved; lateral teeth short, stout, high, pointed, the outer ones in the right valve quite small; ligament short, moderately strong.

Size: long. 3.8 alt. 3.8 diam. 2.8 mill.

Habitat: Crystal Lake, Benzie Co., Mich., collected (over 600 specimens) by Dr. R. J. Kirkland; also in Illinois, Iowa and Kentucky.

Typical specimens are easily distinguished from all other species—except an extreme form of *P. compressum* Pr., from the same place, having rounded beaks without ridges. Yet they are quite distinct. *P. peraltum* is somewhat variable: in some specimens, there are small but distinct projecting angles at the scutum, or scutellum, or both. Others are less high, and the beaks are not so full and prominent.

A few specimens (dead valves) from Havana, Ill., had been received from the Illinois State Laboratory of Nat. Hist. (Mr. Kofoid), in 1895; a few valves from Iowa City, Ia., were sent, in 1896, by Mr. Jas. H. Ferriss, and a few good specimens from Bowling Green, Ky., by Miss S. F. Price in 1899. While all these evidently were of the same *Pisidium*, they seemed not sufficient for establishing a new species upon them, but now proved identical with the Michigan form, and are valuable in showing a wide geographical distribution of our species.

Pisidia are becoming an important factor of our molluscan fauna. Owing to the efforts and the kindness of many conchologists in the United States and Canada, the writer had chances to examine a large number of specimens—over two hundred thousand, during the last five or six years, besides ten thousands of *Sphaeria* and *Calycu-*

linæ. Yet they still represent only a small part of the country, and diligent, careful collecting in many more places and sections is badly needed.

That among such materials there should be many new forms was to be anticipated, but the results were beyond all expectations. This is partly proved by the many species already published. It seems to be necessary to add that the greatest care has been taken in establishing new species. All of them have been seen in every stage of growth; most are represented by hundreds and thousands of specimens, and, in fact, the geographical range of almost all is a wide one. And numerous new forms are in hand, partly have been for years, awaiting new materials for their confirmation. Not only the species in themselves are of interest and value, but also the study of their geographical distribution and their variations. Some of the *Pisidia* are extremely variable, and the same can be said of some of our *Sphaeria* and *Calyculinae*, and their study is very difficult.

This is not the place for an account of the work done by all contributors, a summary of which will be given in a revision to be published. Yet two conchologists have done such work and their success is so unparalleled, the example given by them so suggestive and encouraging, that we can not pass them over in silence.

Mr. Olaf O. Nylander has, since '95, worked up Aroostook Co., Me., and, beside other mollusca, collected and sent for examination about 32,000 recent specimens and large numbers of fossil *Pisidia*. His careful collecting, under great difficulties, in many places over an extensive area of that northeastern part of our country, has added very materially to our knowledge of the molluscan fauna.¹

During the last four years also, Dr. R. J. Kirkland, of Grand Rapids, Mich., has collected and sent for examination about 123,000 *Pisidia* (over 70,000 in '99), and many thousand *Sphaeria* and *Pisidia*, most from Kent and some other counties of Michigan. And it is of importance that both these enthusiastic collectors, like some others also, have paid special attention to even the smallest specimens. Thus we became acquainted with some minute species, while the study of the young of all was greatly facilitated. On the other hand, it is very desirable, or rather indispensable, to have as large numbers of specimens as possible at disposition, from every locality.

¹ See Mr. Nylander's list in THE NAUTILUS XIII, p. 102. (Jan., 1900.)

considering the enormous variability of some species, in order to ascertain whether certain forms are really species, or varieties, or local variations.

J. B. QUINTARD.

It is with great regret that we learn of the death of our old correspondent, Mr. J. B. Quintard, which occurred at his home near Silver Lake, Shawnee county, Kansas, on December 17, 1899.

Born at Norwalk, Connecticut, October 21, 1839, he moved with his parents to Knox county, Ohio, in 1847. In December, 1859, he married Miss Madeline I. Watkins, and in May, 1860, they moved to Kansas, where he selected a site on the open prairie and made a home, which he occupied until his death.

He was a great lover and careful observer of nature, and early took up the study of Conchology. By his own labor in collecting and exchanging, he got together a large collection of shells, and especially of the land and fresh-water species. Mr. Quintard was known by correspondence to most western collectors of fresh-water shells, especially the *Unionidæ*.

GENERAL NOTES.

NOTE ON *VITREA RHODSI* Pils.—The distribution of this species would seem to be much more extended than was indicated when first described (NAUT. XII, 101). I have specimens from Traverse City and Charlevoix in this State, and Dr. R. J. Kirkland has recently discovered it in Ottawa county, which would indicate a general distribution through the western part of Michigan. It has not as yet been noticed in any of the eastern counties. I have also specimens from County Carlton, Ontario; Amherst, Mass., and Orange county, Va., which extend the range much further to the north and east than indicated by Mr. Pilsbry.—BRYANT WALKER.

NOTE ON THE HABITS OF *LIMNÆA MIGHELSI* W. G. Binn.—Extract from a letter of Dr. R. J. Kirkland: "I made a visit to Crystal Lake, Benzie county, Mich., in July and again in October. Along the shores are thousands of dead *Limnæa mighelsi* W. G. Binn.,

and though many hours were spent in July in searching for living ones, not one was found, until an improvised dredge brought them to view from a depth of about twelve feet. Hiring a couple of men to row, about two hundred were taken in half a day's work. This fall, however, I was surprised to see them in shallow water (one to three feet), and I collected over a thousand by wading and picking them up one by one. They were not in groups at all, but scattered irregularly in patches over the bottom. Some of them were half buried in the sand and the greater part resting with the head toward the shore, and where a track was visible, it was a line from deeper to shallower water. During the few days under observation, not a single individual was seen floating on the surface."—BRYANT WALKER.

THE GROWTH OF LAND SNAILS.—Two years ago, nearly, I had sent me two *Helix albolabris* which I put in my wardian case, and have had some thirty or more young from them in two annual crops; the first are about 21 months old. One of these perfected the white lip last year. Whether from being so often handled and being in the room where people are moving has made a difference in their habits I cannot say, but this year a portion of their "growing" has been done in full view, and they often do not go into their shells when I take them up.

One snail put an addition to his house of a full half inch at once. I happened to see him as he was finishing; he had built from the umbilicus on one side, then from the farther side which we call the top, and was connecting the two sides when I found him. The connections seemed like tiny crystals thrown from each side, as ice forms in a pail of water, then it was covered with a jelly-like substance, and in a few days after he had added the first thin gelatine-like wall of lip, and now he has the finished hard white lip.

I have often seen one which has the new addition as much like gelatine as possible, then so brittle that the merest touch will break, then like the old shell.—JENNIE M. H. MORRELL, *Gardener, Maine.*

LAND SHELLS FROM REJECTAMENTA OF THE RIO GRANDE AT MESILLA, NEW MEXICO, AND OF THE GALLINAS R. AT LAS VEGAS, N. M.—Prof. T. D. A. Cockerell sent the following species from the localities named. A previous Mesilla list has been given in NAUTILUS X, p. 42.

Shells from flood-debris of the Rio Grande, Mesilla.

Vallonia cyclophorella Anc.	Pyramidula striatella Anth.
Pupoides marginatus Say.	Helicodiscus lineatus Say.
“ “ variety.	Zonitoides minusculus Binn.
Bifidaria procera Gld.	“ singleyanus Pils.
“ hordeacella Pils.	Limnaea humilis Say.
“ hebes mexicanorum Ckll.	Planorbis parvus Say.
Pupa blandi Morse.	“ umbilicatellus Ckll.
Vertigo ovata Say.	Physa, undet. Young shell.

Gallinas River at Las Vegas.

Vallonia cyclophorella Anc.	Vertigo ovata Say.
Bifidaria armifera Say.	Helicodiscus lineatus Say.
“ procera Gld.	Zonitoides minusculus Binn.
“ hordeacella Pils.	

The species of principal interest is *Planorbis umbilicatellus*, not hitherto known from the Rocky Mountain region south of Montana to my knowledge.

H. A. PILSBRY.

TO WEST COAST CONCHOLOGISTS.

Kind Friends: Nearly thirteen years have passed since I published my little book entitled “West Coast Shells.” It was issued with a double purpose; first, to increase the interest of young people in the study of conchology; and secondly, to assist collectors in the work of identifying their specimens. It is believed that both objects have to some extent been realized.

During these years students of conchology have not been idle. Numerous new species have been brought to light, especially on the southern coast, while the scores of intelligent collectors all over the Pacific Slope have learned much concerning the haunts and habits of well-known species. Eastern and foreign investigators and publishers have been busy also, and there has been more or less change of names and classification.

Repeated requests have been coming to me for a revised edition of “West Coast Shells.” I have delayed undertaking the work of revision, partly from the pressure of other duties, and partly from a desire to secure the latest and most complete information concerning the shells themselves, and the most approved names by which they

should be known. While I am strongly opposed to changing old names except for the best of reasons, it is necessary to know what the authorities are doing in these particulars.

My object in sending out this circular is to invite all who are interested in this matter to assist in the work of revision. I shall be grateful to all who have found difficulties in using "West Coast Shells" if they will write to me concerning their difficulties and make suggestions as to improvements.

I wish also to be informed of any errors, either in names or descriptions, that have been discovered, and shall be thankful to receive suggestions that would be helpful in writing new descriptions. Information concerning new species is especially desired; also any recently discovered facts concerning well-known species.

I would be especially grateful to those who have specimens of new species if they would loan me such as I do not already possess, and give me information as to the names, localities, etc., of any species which are not already mentioned in "West Coast Shells," or of any unusual varieties that should be noticed.

JOSIAH KEEP.

Mills College P. O., Alameda Co., Calif., March 21, 1900.

NOTICES OF SOME NEW JAPANESE MOLLUSKS.

BY H. A. PILSBRY.

The following species were mostly sent by Mr. Y. Hirase. They will be illustrated in the Proceedings of the Academy of Natural Science.

Eulota horrida n. sp. Shell broadly and perspectively umbilicated, depressed, the spire very low conoid, nearly flat, periphery angulated, the angle situated high, base convex, inflated. Surface dull, yellowish-brown, shaggy with epidermal flattened processes and filaments, which are arrayed in six or eight concentric series, on the base, and at the periphery; the upper surface smoother. Whorls $5\frac{1}{2}$. Aperture oblique, subcircular, a little excised by the preceding whorl; peristome thin, slightly expanded on the outer and basal margins. Alt. 6, diam. 14, umbilicus 4 mm. Allied to *H. ciliosa* Pfr. and probably to *H. setocincta* A. Ad., but the spire is lower.

Eulota (Trishoplita?) mesogonia n. sp. Shell umbilicate, with

moderately raised, conoidal spire, distinctly angular periphery and convex base. Uniform chestnut colored. Striatulate and densely though indistinctly granulate, the granules elongated in the direction of growth-lines. Whorls $5\frac{1}{2}$, slowly increasing, the last angular at the periphery, slightly descending in front. Aperture oblique, rounded-lunate, the peristome slightly expanded. Alt. $7\frac{1}{2}$, diam. $10\frac{1}{2}$ mm. Prov. Tonga (Gaines).

Ganesella Jacobii n. sp. Shell rather narrowly umbilicate, semi-globose, thin, pale yellowish corneous; surface striatulate, decussated with incised spiral lines; spire convexly conoidal; whorls $5\frac{1}{2}$, slowly increasing, the last one very indistinctly angular at the periphery in front, becoming rounded on the latter half, convex beneath, excavated around the narrow umbilicus. Aperture oblique, lunate, the peristome narrowly expanded, white, base-columellar margin reflexed. Alt. $13\frac{1}{2}$, diam. $18\frac{1}{3}$ mm.; umbilicus slightly over 1 mm. wide.

Cyclotus (?) *micron*, n. sp. Shell very minute, somewhat discoidal, with low conoid spire and widely open umbilicus; composed of $3\frac{1}{3}$ tubular whorls, separated by deep sutures, the last one barely in contact with the preceding at the aperture; pale corneous, subtranslucent, with delicate growth-striae. Aperture circular, vertical, the peristome simple and thin, continuous. Operculum lodged at the edge, presenting a densely concentrically lamellose external face, the center deeply smken. Alt. $\frac{3}{4}$, diam. 1.6 mm.

Pomatiopsis Hirasei, n. sp. Shell perforate, tarreted, in shape resembling *Pomatiopsis californicus* Pils.; general color pale yellowish green, produced by buff streaks and lines on a light green ground; surface nearly smooth. Whorls remaining 5 (the earlier being eroded or decollate), quite convex, separated by deep sutures. The last third of the last gyration of the suture does not descend as much as the preceding turns, giving the effect of a slightly ascending whorl toward the mouth. Aperture ovate, subangular above, the outline a little flattened on the parietal margin; peristome simple, continuous, black-edged; the columellar margin arcuate, a little thickened and perceptibly dilated. Alt. 9, diam. 4.8, longest axis of aperture 3.6 mm. Operculum ovate, brown, the cicatrix oblong, large, occupying the inner half of the inside face, its edge raised.

I at first thought to place this species in the *Realiidæ*; but on examining the radula, I found it could belong neither to that family nor to the *Assiniiniidæ*, the dentition being far nearer that of *Pomatiopsis*. The formula of denticles is $\frac{3}{2-2}$, 5, 6, 6. The median denticle in the central and admedian teeth is larger than its fellows. This radula differs from that of the American *Pomatiopses* in having two, instead of one, basal denticles on each side of the central tooth. See NAUTILUS XII, 127; X, 37, for information on the American species.

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No. 2.

ÆSTIVATION OF EPIPHRAGMOPHORA TRASKII IN SOUTHERN CALIFORNIA.

BY MRS. M. BURTON WILLIAMSON.

When the frost is on the ground and autumn leaves lie scattered over orchards and forests, it is no surprise to find that land snails (*Helices*) have begun their period of hibernation, and lie sheltered under the layers of dead leaves or hidden in decaying trunks of trees. The annual sleep of the snail in winter corresponds well with the enforced rest of the vegetable world; but in a tropical or semi-tropical climate the atmospheric conditions are different, and in place of a winter rest, snails take their annual sleep in summer. The hibernation of snails in colder countries is reversed, and in its stead æstivation of snails is the result. In the eastern states *helices* take their annual siesta in winter, but in southern California snails differ from their congeners, presenting an illustration of the power of environment in modifying instincts. Instead of going into winter quarters in October and remaining from four to six months without food and motionless, the greatest activity of the southern California *Helix* is during the winter months. The reason for this is that the food supply is plentiful in the winter when the warm rains prevail; and during the summer months the arid condition of the foot-hills, the habitat of these quiet creatures, made the æstivation of snails a necessity, a question of economy, an adjustment of demand and supply. In process of time the necessity for æstivation rather than hibernation became a habit.

When snails require rest in southern California they attach themselves to the under surface of dead cacti, pieces of wood, stones, or

burrow in the soil; in every case the aperture of the shell is upward, with the apex below. With its mucus the *Helix* securely glues this aperture to the under surface of any substance to which it attaches itself. These land snails, being non-operculated pulmonates, their apertures are covered by an epiphragm. (In experimenting on a number of *Helix tudiculata* and *Helix traski*, my experience has been that if the epiphragm has been badly punctured, or broken, the snail will die unless circulation is started by applying moisture.) This covering is composed of several layers of hardened mucus which resembles the tough white skin that lines a hen's egg.

In experimenting with helices in a snailery, a wooden box covered with a wire screen and partly filled with soil, I have found that while one species of snail (*Epiphragmophora traskii* Newc.) would fasten themselves to the strip of wood that braced the lid of the snailery, the other species (*Glyptostoma newberryanum* W. G. B.) would burrow in the soil, their black shells almost hidden from sight. In order to test them I have repeatedly interrupted their æstivation by placing their shells in luke-warm water until the helices could crawl about, but they would eventually be found in separate places, *E. traski* suspended above and *G. newberryanum* below in the soil.

During æstivation the snail's functions are in a state of coma, respiration is nearly suspended, and having retired as far as possible within the shell the mollusk is the embodiment of rest. Its waking is not a voluntary action. Without humidity the snail will æstivate for months and continue in a state of torpor for years if the atmosphere is dry around it. Conchologists frequently quote the example given by Dr. R. E. C. Stearns, of the U. S. National Museum, of a Lower Californian *Helix* that rested, or rather remained in a state of torpor for six years! Other cases of prolonged relaxation of the vital functions of snails are recorded.

Some years ago, in March, 1890, I collected a few land snails (*E. traski* Newc.) from some of the low foot-hills in Los Angeles, and on reaching home, finding them glued to the glass jar, they were left on a stand. In the morning two snails had crawled out of the jar and up the wall and were snugly ensconced in one corner of the ceiling, another one had traveled far in the night and had pre-empted his claim in one corner of the hall ceiling. In order to study developments they were allowed to remain *in situ*. One soon fell down upon the carpet but the other two remained intact. The

household orders were that the helices were to be left undisturbed by brush or broom. The summer came and went, autumn followed, winter came on and still our hermaphrodites "held the fort." No sound of mirth nor music aroused them.

But the rains came on, heavy drenching showers that rushed down the mountains, washed the foot-hills, overflowed the ozanjas, and all nature was in a dripping condition. During one of these storms in January, 1891, the rain came down with such force that it made invidious incursions into the hall during the night, and the snail was found on the floor. In an hour it was as willing as ever to struggle for existence. It ate heartily of celery with its little rasping tongue (radula) beset with multitudes of tiny siliceous teeth.

It was not until February 23 that the other *Helix* had been sufficiently overcome by the forces of nature to loosen its epiphragm enough to descend to the floor. It was placed in a shallow saucer of water, and it assumed its functions as though they had not been arrested.

While these house snails were glued to the ceilings, their relatives in the snailery in the garden had been aroused to activity by the first rain as it pattered through the screen cover; and on January 2, 1891, I found a number of tiny pellucid-looking balls carefully hidden in the moist earth in the snailery. These were the eggs of the snails. In less than three weeks there were young snails. Time had been lost by the house snails, their æstivation extending beyond the requirements of nature had gained them nothing.

It was my intention to study all these forms, and while giving a rest to the "house snails," compare their longevity with the garden helices. But, alas, for the rapacity of the animal kingdom, sowbugs, ants and insects from the rose bushes made war upon the whole snail colony, adults, babies and eggs, and by summer time the houses were empty, the tenants were gone!

A NEW SPECIES OF LIMA.

BY W. H. DALL.

Recent excavations involved in the construction of a tunnel through a hill at Los Angeles, California, on the line of Third street, have developed the presence of fossils, probably Pliocene, in the blue clay through which the tunnel is being cut.

Several specimens, more or less crushed, of a large *Lima* are among the forms collected. This species belongs to the general type of *Lima excavata* Fabr., *L. goliath* Sby, etc., and reaches to a length of four and a half inches. The valves are brilliantly polished, and in the middle part unsculptured, the anterior and posterior thirds are finely radially grooved with shallow grooves of which the outer slopes are less steep than the inner; the incremental lines, obsolete elsewhere, appear in the channel of the grooves and cross striate it here and there, giving the effect of obsolete punctation. I may add that close to the impressed area of the shell there are two or three coarser, deeper radial grooves. The species differs from the South Pacific and all other forms of its group known to me in its much finer and more delicate sculpture and brilliant polish. I await more perfect specimens before trying to figure it, but would propose the name of *Lima Hamlini* for the species in honor of Mr. Homer Hamlin C. E., Asst. City Engineer of Los Angeles, who is much interested in the geology and paleontology of the region, and has made valuable studies of the southern California Tertiary. The specimen in hand was kindly forwarded for examination by Dr. R. E. C. Stearns.

A REVISION OF THE PHYSÆ OF NORTHEASTERN ILLINOIS.

BY FRANK C. BAKER.

While working up the fresh-water mollusks of the Chicago area for a report on the Mollusca, the genus *Physa* came up for consideration, and the chaotic condition of the group, judging by the conflicting opinions of conchologists, seemed to warrant a somewhat critical revision of the species found in northeastern Illinois, and incidentally of northern Illinois. The best-known species, *heterostropha*, is little understood, and seems to be more frequently confounded with *gyrina* than with any other form, excepting, perhaps, *integra*.

A large collection of Physidæ, from different parts of the United States as well as from northern Illinois, has been examined, and the writer believes that all of the species found within the area have been elucidated. It is very probable that there are but ten or fifteen valid species of *Physa* in the United States, six or seven of which are to be found in the northern part of this region east of the Rocky Mountains.

During a visit to the Philadelphia Academy of Sciences some time ago, Mr. Pilsbry called the writer's attention to the fact that *heterostropha* had a smooth shell, while *gyrina* and some others had a shell with impressed spiral lines. Following up this suggestion a large number of Physæ have been examined, with the result that instead of there being two species in northern Illinois, there are at least four species and one variety.

The following notes have been made from fully adult specimens, and the figures are outline drawings of photographs, and are therefore accurate.

Key to Northern Illinois Physæ.

- A. Shell smooth, broad, spire short. *heterostropha*.
- B. Shell with impressed spiral lines.
 - a. Shell rather broad, ovate, spire short, acute; aperture wide and spreading; whorl $4\frac{1}{2}$ -5; shell thinner than b and c; peristome callus bordered by red. *sayi*.
 - b. Shell elongated or cylindrical, narrow, spire generally long; aperture very narrow; whorl 5-6; peristome callus bordered by red. *gyrina*.
 - c. Shell broad, inclining to be shouldered; spire sharply conic; aperture roundly oval; whorls $4\frac{1}{2}$ -5; peristome callus white without red border. *integra*.

Physa heterostropha Say. Fig. 1.

Limnæ heterostropha SAY, Nich. Encycl., Amer. ed., pl. 1, fig. 6, 1817. *Physa fontana* HALDEMAN, Mon. pt. 2, p. 3 of cover; Physa, p. 26, 1841.

Shell polished, subovate; whorls 4- $4\frac{1}{2}$; spire moderately elevated, acute, the whorls slightly convex; color varying from light horn to greenish; sculpture consisting only of fine growth lines; sutures impressed, margined by a white line which is frequently bordered by a dark chestnut line; protoconch consisting of

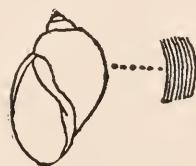


FIG. 1.

one whorl, which is smooth, and varies from porcelain-white to rather dark horn color; aperture rather large, oval, occupying from two-thirds to three-quarters of the length of the entire shell; peristome thin, acute, thickened on the inside by a whitish or bluish callus, which is bordered on the inside with red; columella almost straight, with a whitish callus which is sometimes lined with red.

Length 14.00; width 8.50; aperture length 10.00; width 4.00 mill. (Rochester, N. Y.)

Length 13.00; width 8.50; aperture length 10.00; width 4.50 mill. (Rochester, N. Y.)

Length 13.50; width 9.00; aperture length 10.50; width 4.50 mill. (La Porte, Ind.)

Length 9.00; width 6.00; aperture length 6.50; width 3.00 mill. (Chicago.)

Animal similar to that of *gyrina*. Jaw and radula in all respects like those of *gyrina*. Distribution: eastern and southern states from Maine to Georgia and west to Michigan and Illinois; Southern Canada. Geological distribution: Pleistocene; Loess. Habitat: in ponds and streams, adhering to sticks and stones, and crawling over the muddy bottom.

Only a single lot of shells has been found which could be referred to this species and that was collected in the drift along the shore of Lake Michigan at Miller's, Indiana. The nearest typical *heterostropha* have been found living in Pine Lake, La Porte Co., Indiana. It is very probable that this species is not found in any abundance west of Indiana, its place being taken by *gyrina*, *sayii* and *integra*. Under distribution above, only those states are given from which the writer has seen authentic specimens.

Physa Sayii Tappan. Fig. 2.

Physa sayii TAPPAN, Amer. Journ. Sci. (1), vol. xxxv, p. 369, pl. iii, fig. 3, 1839. *Physa warreniana* LEA, Proc. Phil. Acad. Sci., p. 115, 1864.

Shell polished, ovate, whorl $5-5\frac{1}{2}$; spire elevated, very acute, the whorls moderately convex; color light horn to light chestnut; sculpture consisting of rather coarse growth lines, crossed by numerous fine, impressed spiral lines, giving the surface of the shell rather a wavy appearance, as figured for *gyrina*; sutures slightly impressed, bordered as in *heterostropha*; protoconch consisting of one and a half

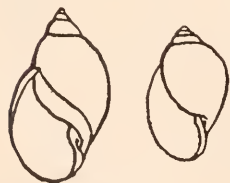


FIG. 2.

smooth, glossy whorls of a dark chestnut color; aperture very large, long oval, three-fourths to four-fifths the length of the whole shell; peristome thin, generally not much thickened within, whitish sometimes bordered with reddish; columella slightly twisted and cov-

ered with a spreading callus; the lower part of the aperture is somewhat produced.

Length 22.00; width 13.50; aperture length 16.00; width 7.50 mill. (Chicago.)

Length 19.00; width 12.00; aperture length 14.00; width 6.00 mill. (Chicago.)

Length 16.00; width 11.00; aperture length 12.00; width 6.00 mill. (Chicago.)

Animal similar in external appearance to all *Physidae*. Jaw and radula as in *gyrina*. Distribution: Ohio, Indiana, Michigan, Illinois, Missouri. Geological distribution: Pleistocene; Loess. Habitat: In stations similar to *heterostrophu* and *gyrina*.

Remarks: This species was at first identical as *aucillaria* Say, but that species, while having the same surface sculpture as *sayii*, is more inflated, the outer lip more spreading and the body whorl more gibbous, the spire being always much shorter and the whorls more convex. The surface sculpture is very beautiful and precisely as described for *gyrina*. This species is not common, and has been found at Joliet, Maywood, Lake Calumet and Lake Michigan near the foot of Oak Street. *Sayii* is apparently closely related to *ampullacea* Gould, a Pacific coast species.

***Physa gyrina* Say. Fig. 3.**

Physa gyrina SAY, Journ. Acad. Nat. Sci. Phil., vol. 2, p. 171, 1821. *Physa striata* MENKE, Syn. Math., ed. 2, p. 32, 1830. *Physa hildrethiana* LEA, Proc. Amer. Phil. Soc., vol. 2, p. 32, 1841. *Physa cylindrica* NEWCOMB, in DeKay, N. Y. Moll., p. 77, pl. V, fig. 82, 1843. *Physa plicata* DEKAY, l. c., p. 78, pl. V, fig. 85, 1843. *Physa saffordii* LEA, Proc. Phil. Acad. Sci., p. 115, 1864. *Physa hawaii* LEA, l. c., p. 115, 1864. *Physa parva* LEA, l. c., p. 115, 1864.

Shell elongated, generally polished, whorls 5-6; spire always very long (as compared with the last two species), acute, the whorls in some cases almost flat, and at best but slightly convex, color varying between light-greenish horn and brick-red; sculpture consisting of well-marked growth lines, crossed by numerous fine impressed spiral lines, giving the shell a wrinkled appearance (see figure of sculpture); these lines appear at first to be raised, but when viewed through the microscope are seen to be impressed between two wrinkled ridges, as seen in the cut; sutures scarcely impressed, but

bordered by a porcelain-white line which is rarely edged with chestnut; aperture rather long, long-oval in form, much narrowed at the upper part, more than a half and less than two-thirds the length of



FIG. 3.

the entire shell; peristome thin, thickened within by a callus which is either bordered by a dark chestnut band or else is itself of that color; columella thickened with a decided white callus or plait; the lower part of the aperture is produced; the periods of winter hibernation are frequently marked by a whitish band in the body of the shell; protoconch consisting of a trifle more than one smooth, rounded, dark chestnut-colored whorl.

Length 17.00; width 9.00; aperture length 11.00; width 4.50 mill. (Chicago.)

Length 26.00; width 12.00; aperture length 14.00; width 5.50 mill. (Chicago.)

Length 24.00; width 11.50; aperture length 13.00; width 5.50 mill. (Chicago.)

Length 19.00; width 10.00; aperture length 12.00; width 5.00 mill. (Chicago.)

Length 22.00; width 10.00; aperture length 12.50; width 5.00 mill. (Chicago.)

Animal with a long and rather narrow foot, acutely pointed behind and rounded before, where it is produced into lateral lobes; the foot does not extend much beyond the edge of the shell; color blackish or yellowish gray, dotted or flecked with whitish or yellowish, the dots being distinctly seen through the transparent shell; the front of the head is ornamented by two yellowish spots of good size, composed of numerous minute dots; the mantle is brown, spotted with yellowish, is reflected over a portion of the shell on the right side, and produced into four filiform digitations; tentacles very long and slender, tapering to a point; head distinct, separated from

the foot by a short neck ; mouth large, in the lower plane of the head, showing plainly the jaw and radula while the animal is grazing along the side of an aquarium ; eyes placed on swellings at the inner base of the tentacles ; respiratory cavity on left side of the shell at the lower point where the peristome meets the body whorl. Length of



FIG. 4.

foot 15.00 ; width 4 mill. extended (Fig. 4).

Jaw in one piece, arched, striated, provided with a central fibrous projection from the superior surface ; ends rounded (Fig. 5, J).

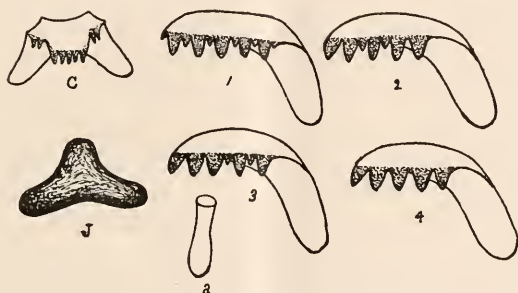


FIG. 5.

Radula : Formula $\frac{95}{13} + \frac{95}{1} + \frac{1}{2.5-2} + \frac{95}{1} + \frac{95}{13}$ (190-1-190) ; central

tooth more or less quadrate, the lower outer corners being very much attenuated ; cusp 9-dentate, 5 denticles being long and narrow, and two on each side smaller and more blunt ; laterals in two alternate series, the primary teeth large, obliquely inclined, comb-like ; the cusps are very peculiar, and vary to a large degree ; some teeth have five long, pointed cusps with six small ones, one between each large one and one at each end (Fig. 5) ; others have but two small denticles, while still others have one or more between (Figs. 5, 2, 3, 4). The secondary teeth are long and narrow, with a wide, blunt cusp. These latter, as also the central tooth and small teeth between the cusps of the primary teeth, are very difficult to observe (Fig. 5).

Distribution : Probably inhabits the whole of the northern and central parts of the United States and Southern Canada. Geological distribution : Pleistocene ; Loess. Habitat : Found very abund-

antly in ponds and streams of greater or lesser size, adhering to sticks or stones, and crawling over the muddy bottom. Inhabits either running water or stagnant pools.

Remarks: This is a very common and handsome species. Its habits are active, moving with a rapid, steady, gliding motion. It is very interesting to watch a number of *Physæ* in an aquarium; as they are crawling along the bottom, one will be seen to rise suddenly to the top of the water and move along with the foot applied to the surface, the shell hanging down. Again, they may be seen descending, suspended by a thin thread of mucus. When the animal rises suddenly, the branchial cavity opens with a faint clicking sound, probably due to the pressure of air in the lung. This species frequently inhabits water as cold as the freezing point, and may be observed in winter gliding along the bottom of a pond when the surface is frozen. The eggs are deposited on stones, the under side of sticks, etc., and are composed of large, glairy, transparent masses.

Several *Physæ* kept in captivity laid four egg masses on April 23, 1897. The egg masses measured 20 by 4 mill., and contained from 120 to 200 eggs. On April 24, ten additional egg masses were laid. The jar contained 15 individuals. On June 3, in the afternoon, the writer noticed a number of young in a jar containing egg masses deposited probably in the latter part of April. The young were half a mill. in length, vitreous in appearance and perfectly transparent. They were very lively, crawling about the jar and feeding voraciously upon the scum found on the sides of the glass. The heart pulsed 120 times per minute. On June 15th the young had increased to one mill. in length. About a week later, unfortunately, the whole lot died, so that no further notes could be taken.

Physa gyrina is by far the most common species of the genus (I might say of any genus) found in the area, and has been found in all parts of northern Illinois. It was at first confused with *heterostrophæ*, but that species has a smooth shell (see above) and is not found in any numbers in the area; it is very probable that *heterostrophæ* is not found west of the Mississippi River, and the quotations of this species from western localities were probably founded on *gyrina*, *sayii*, *gabbii*, *integra*, etc. This species is very variable in this region, some forms approaching *ampullacea* Gould, while others might be taken for *gabbii* Tryon, or *virginæ* Gould, so far as form goes. It is probable that some west coast names will be added to the above synonymy, when more study is given to this genus.

Physa gyrina elliptica Lea. Fig. 6.

Physa elliptica LEA, Trans. Amer. Phil. Soc., vol. V, p. 115, pl. xix, fig. 83, 1837. *Physa aurea* LEA, l.c., vol. VI, p. 18, pl. xxiii, fig. 106, 1839. *Physa troostiana* LEA, Proc. Am. Phil. Soc., vol. II, p. 32, 1841. *Physa nicklinii* LEA, Proc. Phil. Acad. Sci., p. 114, 1864. *Physa altonensis* LEA, l.c., p. 114, 1864. *Physa febigerii* LEA, l.c., p. 114, 1864. *Physa oleacea* TRYON, Amer. Journ. Conch., vol. II, p. 6, pl. ii, fig. 6, 1866.

Shell differing from typical *gyrina* in being more elliptical, having a shorter, more rounded spire, and hence more convex whorls, the spire, as described by Tryon, "with the outline not elevated above a continuation of the general curve of the body." The shell is also more solid and the outer lip thicker with a very heavy,

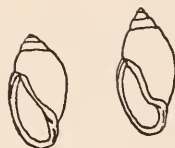


FIG. 6.

bluish-white callus. The surface sculpture is the same as in *gyrina*.

Length 15.00; width 7.50; aperture length 9.50; width 3.50 mill.

Length 11.00; width 6.00; aperture length 7.00; width 2.50 mill.

Length 12.00; width 7.50; aperture length 9.00; width 3.75 mill.

Animal, jaw, and radula, as in *gyrina*. Distribution: evidently the same as *gyrina*. Geological distribution: Pleistocene; Loess. Habitat: Almost always associated with *gyrina*.

Remarks: The typical form of this variety seems at first quite distinct from *gyrina*, but in a multitude of forms (the writer has examined several thousand specimens) is seen to fade imperceptibly into the typical form. From observations in the present area, *gyrina* would seem to be dimorphic, consisting of the typical *gyrina* with long spire, and the variety *elliptica* with short, dome-shaped spire. This belief is strengthened by the fact that the two forms are always associated together. It is not quite as common as the typical form.

Physa integra Haldeman. Fig. 7.

Physa integra HALDEMAN, Mon. p. 33, pl. IV, fig. 7, 8, 1841. *Physa niagarensis* LEA, Proc. Phil. Acad. Sci., p. 114, 1864.

Shell oval, whorls $4\frac{1}{2}$ –5; spire short, pointed, the whole convex; sutures well marked, sometimes banded by a faint white line; color varying from light yellowish horn to pale brown; sculpture as in *gyrina*, the lines being very deep and the wrinkled edges very convex; protoconch consisting of one and a half smooth, rounded, wine-colored whorls; aperture oval, rather wide, produced at the

anterior end, about two-thirds the length of the entire shell ; peris-

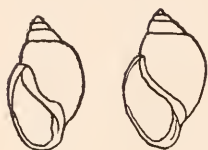


FIG. 7.

tome thin, thickened within the aperture by a heavy white or yellowish callus, which shows through the shell very plainly ; it is never bordered by any color stripe ; the callus of two or three former peristomes may always be seen on the body whorl and sometimes one or two on the spire ; columella

broad, flat, white, a callus spreading over the parietal wall.

Length 12.00 ; width 8.00 ; aperture length 7.50 ; width 3.00 mill.

Length 10.50 ; width 7.50 ; aperture length 7.50 ; width 3.50 mill.

Length 10.00 ; width 6.00 ; aperture length 5.50 ; width 3.00 mill.

Animal not differing essentially from *gyrina*. Jaw similar to that of *gyrina*. Radula similar in form to that of *gyrina*, but differing in having six large, nearly equal cusps, instead of five, in the absence, generally, of small cusps between the larger ones, and in the reflection being wider than in *gyrina* or *heterostropha*. The radula of this species is remarkably uniform in the form of the teeth and in the number of the cusps. The central tooth and secondary teeth appeared to be the same as in the species previously described.

Distribution : Great Lakes and St. Lawrence River, New York, Indiana, Illinois, Tennessee, Michigan, Wisconsin. Found in great abundance in Allen's Creek, near Rochester, New York. Geological distribution : Pleistocene ; Loess. Habitat : At stations similar to *gyrina*.

Remarks : This species has been generally confounded with *heterostropha*, but will at once be separated from that species by the spiral lines ; the general form also is different from any other shell found in this area, and the white callus on the lip is peculiar. It is a common shell at Hickory Creek, Lockport and Joliet, and has been found, though more sparingly, at Calumet Grove, Maywood and at Edgewater. It is more common than *sayii*, but less so than *gyrina*. The specimens from Hickory Creek are quite typical, resembling closely Haldeman's figures (pl. 4, figs. 7, 8) in his monograph of fresh water mollusca.

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No. 3.

IN SEARCH OF POLYGYRA PILSBRYI.

BY JAS. H. FERRISS.

In the month of February, both in 1899 and 1900, I made trips to Arkansas for health and shells, and on both occasions stopped at Hardy, Sharp county, Ark., on Spring River, which heads at the famous Mammoth Springs, in Missouri. This part of America at some time was plainly lifted by an enormous upheaval, and the limestone came down without regard to good order. The highest points are probably 1000 feet above the sea.

Spring river is a beautiful stream. The water so pure and deep is of a Nile green in color, but in every half mile or so at this point there is a natural dam, covered with fine unios and "periwinkles." When Messrs. Sterki and Simpson have helped me over the hard places, a list of these will be given. I found this year one new Unio anyhow.

Half of one day this year was given to Little Rock, where good collecting is to be found in a rocky bluff near the Iron Mountain bridge.

Upon both trips I jumped to DeKalb, Bowie county, Texas. Last year I went with a party of turkey hunters as far as Little River, in the Choctaw Nation, all in the low lands, then by rail to Tulsakahoma and Poteau, on the Frisco road—another blown-up limestone country. In this part of the Indian nation the road passes between two mountain ranges. It is the prettiest of landscapes, and I am sure in the month of May the snails swarm out of the damp corners and fern-clothed rocks in great numbers to view the scenery. Judging by the government maps of near-by territory, these mountains are about

1,000 or 1,500 feet above the sea. From Poteau, Sugarloaf, a dozen miles away, could be seen, and this knob runs up to 2,000 feet; but a cold wave drove me home before I could make this mountain a visit.

In three days, at Poteau and Tushkahoma I found *Polygyra Binneyana* Pils., *Poly. divesta indianorum* Pils., *Poly. dorfeuilliana percostata* Pils. and *Gastrodonta demissa lamellata* Pils. These places are about 80 and 40 miles east of Limestone Gap, where Simpson found *Poly. kiowaensis*; 50 miles west of Mena, and Mena is 70 west of Hot Springs, where *Poly. kiowaensis arkansensis* Pils. was found. I never saw either, and I hunted hard.

But in the winter many shells surely could not be found. It was next to impossible to find a mature *Omphalina friabilis* or a *Pyramidula solitaria* alive, but their dead shells were common. Perhaps many of these species, as in the Tennessee mountains, are clannish sticklers for locality.

The *P. dorfeuilliana*, *monodon* and *G. demissa* colonize under logs, a pine log sometimes if charred, but the oaks with a rough bark suit them better. The Mesodons were found by digging. In fact nearly all of my new shells were found by quarrying. The first was *Poly. cragini*, described by Call. This I found on my old farm at Thayer, Kansas, while quarrying sandstone in search of fossil plants. Since then I have been a great digger, looking on the well-drained and ventilated rock, dampened only by the soil, as the best locality to find a new species. High up on the mountains is good ground, I have always supposed because it is a poor place for lazy collectors.

This year a Texas friend, who had a team, wagon and canvas cover, went with me from DeKalb, Texas, to Naples, Texas, on one trip, and then to Mena, Arkansas. I walked, and rolled over the rocks and logs, and he good-naturedly drove the team, and at good places stopped the procession and helped gather the shells. In this journey of over 200 miles I do not think I rode over 15, and I do not think he walked that far, except in our side journeys on foot. At night we made a shed of our wagon sheet, and with a roaring pitch-pine fire in front and plenty of blankets, got along nicely through snow and rain, or when the thermometer dropped to zero a few times.

The rivers were high after having been very low, but we could tell by the remains that it was a very rich region in *Unionidæ* for the seasonable comer. From Naples to the mountains, *P. dorfeuilli-*

ana, *monodon aliciae*, *cragini* and *thyroides* were the rule, except on a chalky uplift called Rocky Comfort in Arkansas. Here we found *Helicina orbiculata tropica*, *Bulinulus dealbatus* and *Omphalina friabilis* in the uplands, and *Poly. texasiana* (banded) and *Poly. monodon friersonii* in low land.

Striking the hill country near Horatio, under the first stone outcrop we found *P. albolabris Alleni* and the first *Poly. Binneyana* I had seen alive. Wherever we found a shaded hill-top after that, with an outcrop of rock, we found these shells; and from the number of "bones" scattered about, they must be plentiful on warm spring days. Sometime I hope to get enough for all of my friends. We occasionally found *P. Binneyana* traveling, for there were times a week together when we walked in our shirt sleeves and the frogs and birds were singing.

P. albolabris was found more frequently under logs, but I found only one *binneyana* in that situation. Two *P. albolabris allenii* here usually hibernate together, just under the soil, face upwards. At Hardy I found as many as eight under one log, but the Hardy shell seems to me another variety, or a subdivision of a variety. It is the same as I have found in Kansas, smaller than the Mena *alleni*, more solid and compact, and more perfectly opaque.

From Horatio to Mena it is a clay hill country, and the shells were much the same. At Mena we seemed to strike a truly snail territory. Here the Rich Mountain range is 2,750 feet above sea level, the Fourche and Black Fork ranges were about as high, the Chastats about 2,000 feet, and it was but a little distance to the Magazine Mountain and the Petit Jean range, as high as the Rich Mountains. I found deep, mossy, ferny coves that in the Tennessee mountains would be jeweled with snails. *Gastrodonta demissa brittsi* here was large as *acerra*, and the species were more numerous. It looked altogether more promising. Some day, with an industrious collector, I should like to start from Hardy and never stop until we had gone into the panhandle of Texas. Limestone bluffs and coves are on every hand. There could be new shells every day. With the exception of Simpson's visit to Kiowa, in the Indian nation, and my own trips, the rocks were probably never scratched.

The following is my catch, named with much assistance from Mr. Pilsbry, numbered after the Pilsbry check list:

9a. *Helicina orbiculata tropica* Say. DeKalb, Lanesport, Rocky Comfort, Gillham, Mena.

48. *Vallonia pulchella* (Müll.). Lanesport, one specimen in 1899.

68. *Polygyra leporina* (Gld.). From Mt. Pleasant to Horatio, the animal black as *Z. nitidus* (Müll.), in damp situations, under logs and stones, or feeding about near by; active in winter.

70. *Poly. Dorfenilliana* Lea. Naples to Mena, sometimes over one hundred in little pockets under logs and stones in well-drained soil. Every lot seemed a little different in color or size, and upon this last trip I collected 1,281. It is abundant in my travels from Arkansas City, Kansas, to Hardy, North Arkansas, to Waco, Texas, and all in between.

70a. *Poly. Dorf. Sampsoni* Weth. Tushkahoma, Ind. Ter., 1899. Fairly plentiful in the rocks.

70b. *Poly. Dorf. percostata* Pils. Poteau, Ind. Ter., 1899. Fairly plentiful on dry mountain side under slabs of sandstone and small logs.

72. *Poly. Jacksoni* Bld. At Poteau in '99. One large specimen found at Mena this year "of the variety with wholly closed axial perforation not uncommon at Fort Gibson."

79. *Poly. Texasiana* (Moric.) Opposite Lanesport in Texas, at Rocky Comfort and Chapel Hill, Ark., next to the water under drift. At Rocky Comfort, banded.

95c. *Poly. Cragini* (Call). Naples, to Mena, under logs in low land, usually. The animal is black and the shell more robust and about one mm. larger than the Kansas type, which is $8\frac{1}{2}$ and 9. The types are a bright, cherry red, these of Ark. nearer the flat corneous brown color of the usual *P. thyroides*.

97. *Poly. inflecta* (Say). Rocky Comfort to Mena.

109a. *Poly. albolabris Alleni* (Wetherby). Horatio to Rich Mountain Station, and at Tushkahoma, I. T. This variety has a thin shell and the color same as *divesta*, glossy. Measures from 28 mm. to 32, and in some cases the umbilicus is partly open.

110. *Poly. exoleta* (Binn.) Mena.

112. *Poly. divesta* (Gld.) A few dead specimens in '99 at Tushkahoma.

112a. *Poly. divesta indianorum* (Pils.) a few dead specimens and young (now alive in my snailery), at Tushkahoma and Poteau in 1899.

112-1. *Poly. Binneyana* (Pils.) a few dead shells and young at Tushkahoma and Poteau in 1899, and one dead at Hardy in drift.

I found it this year from Horatio to Rich Mountain most plentiful in the rocks scattered over the creek bottoms near the city of Mena, in company with *Gastro. demissa Brittsii* and *Poly. hirsuta unciifera*. The measurements were from 23 diam. 11 alt., to 28 mm. diam., 13 alt.; all $5\frac{1}{2}$ whorls. In the Chastat Mountains four miles south I found a smaller variety and got a few alive by digging down a couple of feet. These ran from 16 diam., 8 alt., to 20 diam., 9 alt., with not quite 5 whorls.

124. *Poly. thyroides* (Say). DeKalb to Mena, occasionally, under logs in damp situations. Pilsbry will have much to say on this species, I think, as they run from the *clausa* size to the largest *thyroides*, and were so without regard to locality. The large size were usually found in situations suitable for *multilineata*, while the smaller were about the rocks and under logs upon higher ground.

134-1. *Polygyra Pilsbryi*, n. sp. Shell imperforate, lens shaped, about equally convex above and below, corneous-brown, the surface rather glossy, sculptured above with strong, slightly curved, uneven riblets, running with the growth lines; the riblets on the base very uneven or interrupted as though composed of compressed radial laminae, arranged in several concentric circles. Whorls fully 5, slowly increasing, the last carinated at the periphery, abruptly and shortly deflexed in front. Aperture basal, hook-shaped or like the letter "J" reversed; contracted by a long, arcuate parietal lamella, which extends to the axis and is decidedly curved in, or entering, at its outer end, and is connected with the end of the outer lip by a slight callous ridge. Basal lip reflexed and prostrate, with a rather shallow median notch, much more conspicuous in a front than in a basal view. Alt. 5, diam. 10 mm. Rich Mountain Station (Mt. Mena), Polk Co., Arkansas, on mountain, by roadside leading from R. R. station to the hotel, two specimens (one dead).

Allied to *P. labrosa*, from which it differs in the remarkable sculpture and the form of the basal lip and notch. This shell was picked up by my partner, Mr. Jolly.

At the suggestion of Bryant Walker it is named in honor of Dr. Henry A. Pilsbry, the very one who of late years has given conchologists the most delight, by his enormous zeal and industry, and his untiring exactness. I was instructed by Mr. Walker to find something for the occasion as large as *indianorum* or *Ferrissi*, but this shell has unusual features to make up for the disappointment in

size. It is the best novelty in American shells found, I believe, for some time.

138. *Poly. stenotrema* (Fer.). Found a few on the slope of the Chastat Mountains south of Mena.

139c. *Poly. hirsuta uncifera* (Pils.) n. var. In both the Chastat and Rich Mts. at Mena. From its silvery, clean appearance and unusually prominent basal lip, I believed this to be a new variety, and gathered all I could find. When one is out in the woods, by the way, he cannot always tell what is what.

141a. *Poly. monodon fraterna* (Say). Rocky Comfort on the bank of a creek in company with *friersoni* and *aliciae*.

141b. *Poly. monodon aliciae* (Pils.). Mt. Pleasant and Naples, Texas, to Horatio and Ultima Thule, Ark.

141d. *Poly. monodon friersoni* (Pils.). DeKalb, Texas; Rocky Comfort and Cove, Ark.

141e. *Poly. monodon imperforata* (Pils.), n. var. Rocky Comfort, Mena and Cove. Mr. Pilsbry has thrown a bomb into the monodon-Leai camp, and I merely list these, leaving the description for the article he promises the readers of the NAUTILUS.

153. *Bulimulus dealbatus* (Say). DeKalb, Rocky Comfort, Gilham, Mena.

180. *Strobilops labyrinthica* (Say). Cove, one specimen.

184. *Pupoides marginatus* (Say) [*Leucocheila fallax* of authors]. At Cove under rails in an abandoned field, and at Cerro Gordo under logs; plentiful in company with small red *Poly. thyroides* and *Bifidaria contracta*.

186. *Bifidaria armifera* (Say). DeKalb, Lanesport and Mena.

187. *Bifidaria contracta* (Say). Cove.

247. *Omphalina friabilis* (W. G. B.). DeKalb to Mena, most plentiful at Rocky Comfort.

263. *Vitrea petrophila* (Bld.). Mena. This is the first time this species has been found west of the Mississippi. Three others were also found in this catch that may turn out to be a variety of *V. wheatleyi* (Bld.).

270. *Vitrea indentata* (Say). From Morris' Ferry to Mena.

285. *Vitrea Simpsoni* (Pils.). Morris' Ferry to Mena, both under logs and in the rocks, active.

278-1b. *Conulus chersinus trochulus* Reinh. Cerro Gordo, Hatton's Gap and Chastat Mts., rocks and under logs, rare.

283. *Zonitoides arboreus* (Say). Mt. Pleasant, Texas, to Mena, Ark.

291. *Zon. laeviusculus* (Sterki). One in the Red River bottoms in 1899.

297. *Gastrodonta demissa* (Binn.). Morris Ferry to Mena.

297a. *G. demissa Brittsi* (Pils.). Ultima Thule and Mena. At the latter place in stone piles in the creek bottoms I found a large form. The largest measured 10 mm., and I supposed at the time I had run upon *acerra*.

297b. *G. dem. lamellata* (Pils.). From Morris Ferry to Mena. This was generally found under the logs and very often in company with *demissa*. The largest of both measured about the same, 8 and 9 mm. diameter.

338. *Pyramidula alternata* (Say). From Rocky Comfort to Mena. All rather strongly ribbed and dark in color.

367. *Succinea avara* Say. At Mt. Pleasant, Texas, and Cove, Ark.

As space is valuable in this journal, and my search at these points was far from thorough, I will merely give a list of species found at Hardy and Little Rock, Ark., and Dennison, Texas, not included in the above. Hardy is a particularly good locality, as there is a wide range of species. I found *Vitrea simpsoni* here on my last trip, the most northern and eastern limit so far recorded.

119c. *Polygyra appressa* (Say). At Hardy a highly sculptured variety with small denticle upon the upper lip. This variety is known as Say's "variety A." It measures from 18 to 20 mm. diameter.

119d. *Poly. appressa perigrapta* (Pils.), typical. Little Rock. I also have this from extreme northwestern Arkansas.

120. *Poly. elevata* (Say). Hardy.

125. *Poly. clausa* (Say). Hardy.

134. *Poly. labrosa* (Bld.). Little Rock.

190. *Bifidaria procera* (Gld.). At Hardy in '99.

198. *Bi. curvidens* (Gld.). At Hardy in '99.

199. *Bi. pentodon* (Say). At Hardy in '99.

278-1a. *Comulus fulvus dentatus* (Sterki). At Hardy in '99.

338c. *Pyramidula alternatararinotata* (Pils.). At Dennison, Texas.

239. *Circinaria concava* (Say). Hardy and Little Rock.

340. *Pyramidula solitaria* (Say). Hardy.

342. *Pyr. perspectiva* (Say). Hardy.

346. *Helicodiscus lineatus* (Say). Hardy.

NOTICES OF SOME NEW JAPANESE MOLLUSKS.

BY H. A. PILSBRY.

[Continued from May No., p. 12.]

Buliminus Hirasei n. sp.

Shell rimate, cylindric-conic, rather solid, whitish-corneous or pale reddish corneous, with opaque white streaks and lines. Surface irregularly striatulate and very finely though rather irregularly spirally striate. Spire with quite convex outlines, a trifle attenuated near the obtuse apex. Whorls 8, the first slightly convex, following whorls *almost flat*, the last one more convex. Aperture but slightly oblique, pale reddish-brown within, ovate; peristome white, expanded, thickened within; columella simply concave, without a fold; parietal callus very thin in the middle, thickened toward the ends, having a low tubercle near the posterior angle.

Length 19, diam. 9, of last whorl above aperture 8; length of aperture 8.3 mm.

Length 19, diam. 8, of last whorl above aperture 7.5; length of aperture 7.6 mm.

Kikai, Prov. Osumi, Japan (Y. Hirase).

This species differs from *B. reinianus* Kob. and *andersonianus* Mlldff., in the obese form and especially the light coloration. It is much smaller and especially shorter than *B. japonicus* Mlldff., which was described from a single beached specimen. *B. japonicus* while decidedly larger, alt. 28, diam. 11 mm., the aperture 11 mm. long, has a half whorl less ($7\frac{1}{2}$), and no mention is made by Dr. v. Mölendorff of a tubercle near the posterior angle of the peristome, such as occurs in *B. Hirasei*.

It is named in honor of Mr. Y. Hirase, of Kyoto.

Buliminus extorris var. **omiensis** n.

Shell rimate, resembling *B. cantori* in general form, large, solid and dark chestnut brown; irregularly striate, the striae more or less cut into granules by very irregular spirals. Spire with convex outlines below, straight above, the last two whorls of about equal diameter; apex obtuse. Whorls $8\frac{1}{2}$, convex, the last rather compressed. White, somewhat thickened within, the ends connected by a white cord across the parietal wall, thickened into a slight tubercle near the posterior angle. Columella concave below, having a short strong fold above.

Length 29, diam. 10, length of aperture 10.3, width 8.3 mm.

Length 29.5, diam. 10, length of aperture 11, width 7.8 mm.

Ibuki, prov. Omi, Japan (Y. Hirase).

I refer this form with some doubt to *B. extorris* Brancsik (Jahrsheft Nat. Ver. Trencsiner Comitatus, 1891, p. 81, pl. 7, f. 3), described as probably from Japan; but that species has a narrower aperture very like that of *B. cantori*, and is a more slender shell than this one, with the aperture and diameter less than one-third the length of the shell, while in var. *omiensis* these measurements exceed one-third. *B. e. omiensis* is a narrower shell than *B. japonicus*, with an additional whorl and folded columella. The peristome and parietal callus are more developed than in *B. reinianus*.

***Buliminus callistoderma*, n. sp.**

Shell rimate, thin, *conic*, somewhat translucent, of a brownish olive color; somewhat glossy, *densely granulose* in spiral series. Spire rather straightly conic; apex obtuse. Whorls $5\frac{3}{4}$, convex, the last a little ascending in front, swollen, convex beneath. Aperture irregularly ovate; *peristome thin*, expanded; columellar margin dilated, reflexed above; parietal callus a mere translucent film, not tuberculate or thickened near the posterior angle.

Length 10, diam. 5.5, length of aperture 4.9 mm.

Ogasawara Shima (Bonin I.), Japan (Y. Hirase).

Quite unlike other Japanese or Loo Choo species in its short, conic form, the small number of whorls, thin shell, and densely granulose surface.

(*To be continued.*)

SUPPLEMENTAL NOTE ON PLANORBIS CORPULENTUS SAY.

BY BRYANT WALKER.

Dr. E. W. Hubbard, of Elyria, Ohio, whose catalogue of shells of that State was published at an early date, and who there cites *P. corpulentus* as one of the species represented in his collection, was a grandfather of Mr. George H. Clapp, of Pittsburg, Pa. Mr. Clapp has kindly sent to me for examination two sets of *Planorbis* from Dr. Hubbard's collection, labeled *P. corpulentus*, one from Elyria, the other without locality. Both are *P. trivolvis* and do not differ from that species as usually found. This unexpected verification of the

misconception of Say's species, entertained by the early collectors, is both interesting and valuable.

My attention has been also recently called to the fact that Tryon first formally differentiated the west coast form from *P. corpulentus* as *P. binneyi*, in his review of Binney's "Land and Fresh-Water Shells," Part II, in the Am. Jour. of Conch., III, p. 197 (1867). This citation should, therefore, be added to the bibliography appended to my article in the April NAUTILUS.

The following typographical errors in that article should also be corrected :

In foot-note on page 134 delete the words "part of." Also for "Say," in lines one and three, read "Jay."

On page 136, in the quotation from Mr. Whiteaves' letter, for "five" read "fine."

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE AMERICAN SPECIES OF THE FAMILY DIPLODONTIDÆ. By W. H. Dall (Extracted from the Jour. of Conch. Vol. IX. pp. 244-246, Oct. 1899). Dr. Dall says: "The family Diplodontidæ comprises the genera *Felania*, *Diplodonta*, *Ungulina* and *Joannisiella*. The Cryptodontidæ which have been by some authors united with this group, possess very remarkable anatomical characters, and should be kept separate. *Joannisiella* has long been confounded with *Cyrenoides*, from which much misconception has arisen. The former is a brackish water *Diplodonta* with a flattened foot, the latter belongs to a distinct group. The typical *Felania* is close to *Diplodonta*, but many Lucinoid shells have been mistakenly referred to *Felania*.

East American Species.

Diplodonta punctata Say (*Amplidesma*). Syn. *D. venezuelensis* Dkr. *D. janeirensis* Rve., *D. subglobosa* C. B. Ads. *D. brazilensis* Mitre, *D. orbella* Gabb, *Mysia pellucida* Heilp. Cape Hatteras to South Brazil.

Diplodonta nucleiformis Wagner. Syn. *D. elevata* Conr., *D. carolinense* Conr. Coast of the Carolinas, 15-52 fathoms; fossil in the Miocene of Virginia and N. Carolina.

Section *Felaniella* Dall, 1899.

Diplodonta candeana Orb. Marco, Florida, to Brazil.

Diplodonta vilardibocana Orb. Brazil and Argentine coasts.

Section *Phyciderma* Dall, 1899.

Diplodonta soror C. B. Ads. Jamaica, north to the Florida Keys and Texas; fossil in the Miocene of Virginia and N. Carolina.

Diplodonta semiaspera Phil. Syn. *D. granulosa* C. B. Ads., *L. semireticulata* Orb. Cape Hatteras to Rio Janeiro, Brazil; fossil in the Pliocene of Florida.

Diplodonta puncturella Dall, n. sp. Jamaica; fossil in the Oligocene, Bowden, Jamaica.

Diplodonta platensis Dall n. sp. In 11 fathoms off Rio de la Plata.

Section *Sphaerella* Conrad.

Diplodonta verrilli Dall, = *D. turgida* V. & S., 1881, not Contr. 1848. Martha's Vineyard, Mass., to N. Carolina, in 15-69 fathoms.

West American Species.

Diplodonta orbella Gould. (*Sphaerella tumida* Contr. Ms.) British Columbia to Lower California.

Diplodonta tellinoides Reeve. Panama to Guayaquil.

Diplodonta discrepans Cpr. Mazatlan.

Diplodonta subquadrata Cpr. Not *D. subquadrata* Gabb, but perhaps *D. undata* Cpr. Cape St. Lucas to Acapulco and Mazatlan.

Section *Felaniella* Dall.

Diplodonta obliqua Phil. (*Lucina calculus* Reeve). Cape St. Lucas, Mazatlan.

Diplodonta cornea Reeve. Gulf of Nicoya.

Diplodonta sericata Reeve. *Felania sericata* Cpr. Gulf of California.

Diplodonta nitens Reeve. Gulf of Guayaquil.

Section *Phlyctiderma* Dall.

Diplodonta cælata Reeve. Bay of Guayaquil.

Diplodonta semirugosa Dall, n. n. = *D. semiaspera* Cpr. not Philippi. Gulf of California.

DIE CONCHYLIEN DER PATAGONISCHEN FORMATION. By H. von Ihering. (Neues Jahrbuch für Mineralogie, Geol. und Palæon. Bd. II, pp. 1-46, taf. I, II, 1899.) There are recorded from this formation 69 species. 9 new species are described, followed by general observations on the formation and fauna.

LAND AND FRESHWATER MOLLUSCA OF INDIA, Vol. II., pt. 9. By Lieut.-Col. H. H. Godwin-Austen. The part now before us continues the account of the *Zonitidæ*, a large part of both text and plates relating to the soft anatomy of the various forms. The groups *Macrochlamys*, *Eurychlamys* (n. s.-g.), *Ratnadvipia* (n. s.-g.), *Euplecta*, *Girasia*, *Austenia*, *Microcystina*, *Microcystis*, *Mariella*, *Bensonia*, *Haughtonia* (n. s.-g.), *Nilgira*, *Ariophanta*, *Khasiella* (n. s.-g.) are treated in more or less detail.

In so large an amount of new and interesting information, only a few points can be specially mentioned.

In *Macrochlamys pedina* the spermatheca was found to contain not less than seven spermatophores; and the morphology of the

spermatophore in various Indian genera is discussed at some length. The value of this organ in classification is stated to be not inconsiderable, as it is subject to modification probably generic in constancy. In *Euplecta semidecussata* the vagina (or free oviduct) is swollen above its union with the spermatheca duct, the author interpreting this structure as a provision for retaining the ova, and terming it the "ovitheca."¹ In treating of *Mariella*, Godwin-Austen adopts Cockerell's suggestion that the *M. dussumieri* was from Mahé on the southwest coast of Peninsular India, not Mahé, one of the Seychelles. The genus is shown to be closely allied to *Girasia*.

By restricting several parts of his work to Zonitid anatomy, a quantity of data invaluable to other workers in this difficult group has been amassed, although, as Godwin-Austen modestly points out, the time for definite classification of the whole group has not yet arrived.—H. A. P.

GENERAL NOTES.

AGE OF DEPOSIT UNDERLYING LOS ANGELES, CAL.—The discovery of the remains of a species of *Radiolites*, *R. Hamlini* Stearns, in the Third Street Tunnel clays in the city of Los Angeles, of which we have been informed, is of exceeding interest through its bearing on the question of the geologic age of the region, which has been in doubt (*Cf.* NAUTILUS, June, 1900, p. 15). The *Radiolites* is a Cretaceous form and not heretofore reported from the west coast.

ERRATA.—For "vertical" in the sixth line of the second paragraph, page 3 of the May number, read "ventral." In the next paragraph, fourth line, after the word ligaments, read "is" instead of "are."

LISTS OF RECENT MOLLUSCA.—Messrs Sowerby & Fulton have issued a series of lists of recent mollusks, enumerating a large number (11,300) of the known species of most of the genera, classified according to late authorities. They are well and accurately printed, and collectors will find them useful and interesting.

TO A SLUG. (IN ALCOHOL.)

Hail, Limax!—clammy, slimy thing,
 Poor houseless wretch, of thee I sing!
 Though ended is thy earthly run,
 Thy glory is but yet begun.
 For Science, with obtrusive pride,
 Will keep intact thy mortal hide
 And suffer thee, for future gain,
 In best of spirits to remain.

Oakland, Cal., Apr. 15, 1900.

H. H. BRUENN.

¹ Perhaps "oötheca" would be better, oovitheca being a hybrid word.

THE NAUTILUS.

VOL. XIV.

AUGUST, 1900.

No. 4.

A NEW MUREX FROM CALIFORNIA.

BY WM. H. DALL.

Murex petri Dall, n. sp.

Shell solid, when perfect with an acute produced apex of four or five whorls, followed by four ordinary whorls; nepionic shell with convex shouldered whorls with up to six rounded varices, spirally sculptured with rather prominent threads; color of the shell purplish-brown more or less minutely mottled or articulated with paler spots; surface with obsolete flattish spiral threads stronger on the backs of the varices, and, when perfect, also showing very minute spiral striation; whorls between the varices with a single not very prominent knob; varices flattish, with five or six projecting points or digitations separated by shallow emarginations and slightly excavated on the forward face; these projections are not recurved; anterior face of the varices covered with profuse crinkled imbricating lamellæ; a marked sulcus between the anterior digitation and the canal; aperture ovate, thickened with a projecting yellowish margin without any dentiform process; the interior shows about six nodular denticles on the anterior two-thirds of the outer lip; canal closed, rather long, sharply curved to the right; lon. of shell 65, lat. 32; of aperture lon. 15.6, lat. 11.5 mm.

Habitat, San Pedro, in rather deep water. Mr. and Mrs. Oldroyd.

This shell belongs to a group of Murices which is exceptionally developed on the Pacific coast; having three varices and sometimes a basal tooth projecting from the margin of the aperture. Those

with the tooth belong to the genus *Pterorhytis* Conrad (long called *Cerostoma*) and those without a tooth have had various names applied to them from *Ocinebra* to *Pteropurpura*. Of the allied species *M. californicus* has scaly spirals of three sizes, ending in sharply pointed channelled recurved varical digitations; *M. trialatus* Sowerby has dark brown and white color bands, the shoulder of the whorls excavated, the large posterior digitation of the varices curved toward the apex of the shell, and the varix has no anterior sulcus next the canal. *M. carpenteri* Dall, is nearly smooth, thinner than the others, and with no knobs between the varices on the whorls. All have similar opercula of muricoid type.

A NEW LAMPSILIS FROM ARKANSAS.

BY JAMES H. FERRISS.

Lampsilis Simpsoni.

Shell sub-solid, elongated, slightly obovate, narrowed in front, and rather evenly rounded at both ends, somewhat inflated, having the greatest diameter at the middle and gradually tapering each way to the ends, feebly gaping at the anterior base and behind, beaks rather low but distinct, their sculpture consisting of ill defined, irregular subnodulous corrugations; epidermis well developed, in the young specimens projecting beyond the shell all around, slightly concentrically wrinkled, and showing the rough irregular growth lines; tawny with green rays and coppery beaks in the young, brownish or blackish in the old state; posterior ridge well marked in the earlier stages of growth. Hinge line evenly curved; pseudo cardinals reduced to mere stumpy vestiges; there are two feeble, remote laterals in the left valve and one in the right; epidermal matter folded in along the hinge line; anterior cicatrices rather deep, irregular; posterior cicatrices shallow; nacre shaded violet, bluish and coppery, iridescent behind. Length 95, height 50, diameter 32 millimeters. Spring River, Hardy, Arkansas.

This specimen seems to stand between *Lampsilis tenuissimus* and *L. gracilis*. The former is more compressed, has a stronger posterior ridge, is pointed behind, and is inflated at or just behind the center of the base, and gaps more decidedly behind. It has something the form of certain specimens of *L. gracilis*, but is more elongated and

straighter on the basal line. Three specimens were obtained, one adult, which is probably a male, and two young shells. The latter are very different from young *gracilis*, having the epidermis well projected around the border of the shell, and the outlines of the adult state.



To help commemorate the memory of one who has given nearly a life work towards perfecting the history of the humble clam, I name this in honor of Chas. T. Simpson of the National Museum. Types in my own collection.

NOTICES OF NEW AMERICAN SNAILS.

BY H. A. PILSBRY.

Gastrodonta intertexta volusæ, n. var.

Shell small, *thin and fragile, subtranslucent*, pale brown, somewhat glossy, the surface decussated by impressed spirals cutting fine but sharp striæ above, smoother but still decussate below; rather widely perforate. Whorls $5\frac{1}{2}$, the earlier $1\frac{1}{2}$ smooth, last whorl slightly angular at the periphery, quite convex beneath. Aperture *without the slightest trace of callus within*. Alt. 5, diam. 8 mm.

Near "Mount Taylor," an aboriginal mound on the St. John's River, south of Volusia, Volusia Co., Florida; coll. by Pilsbry & Johnson. Types no 75,769 coll. A. N. S. P.

This shell differs from *intertexta* in the very small size, fragile texture, and total lack of an internal callus within the last whorl near the aperture. Some 56 specimens collected agree in these characters; and as I have seen no intermediate specimens, the form may prove be specific. However, the St. John's valley is deficient in lime; the land shells are in some other cases quite thin for their species, a fact which has its weight. But in the Tannersville valley of the Catskills, a sandstone region where snails are rare and actually eat each other's shells for lime, the *intertexta* I found still had the characteristic callus within the mouth.

Alexia myosotis marylandica, n. var.

Inner lip triplicate; outer lip with a conical tooth at its upper third, below which it is thickened by a callous rib.

Mouth of St. Leonard's Creek, Patuxent River, Maryland, collected by Charles W. Johnson.

Pyramidula Elrodi, n. sp.

Shell openly umbilicate, much depressed and acutely keeled, moderately solid. Spire but slightly convex; whorls 5, the first smooth, the next $1\frac{1}{2}$ rather convex, finely and regularly ribbed, the following whorls flattened, impressed above an acute keel which fills the suture, the last two whorls *very strongly, irregularly ribbed*, the ribs running with growth-lines, wrinkle-like; last whorl with *an acute peripheral keel, pinched and concave above and below it*, the keel of the preceding whorl projecting more or less above the suture; base convex, heavily ribbed, the umbilicus large and funnel-shaped. Aperture oblique, irregularly oval, angular at position of

the keel; peristome simple, the margins converging; parietal callus short and rather thin.

Alt. 9, diam. 21-22 mm.

Mission Mountains, Montana (Prof. M. J. Elrod).

This species holds toward *P. strigosa* a relationship like that of *P. cumberlandiana* toward *P. alternata*. Except in being more widely umbilicated and with a wider last whorl, it would be well resresented by the published figures of *Epiphragmophora circumcarinata* (Stearns). The ribs are less regular than in the typical form of *P. idahoensis*, but are equally strong. None of the wonderful series of *strigosa* varieties discovered by Hemphill approach this form; which could not, with present information, be considered a sub-species of *strigosa*. It is, like *idahoensis* and *haydeni*, doubtless the terminal member in a differentiation-series from the *strigosa* stock, but the connecting links are wanting in the recent fauna, so far as present collections show.

It is named in honor of Prof. M. J. Elrod, of the University of Montana.

Helicodiscus Eigenmanni n. sp.

Shell similar to *H. lineatus*, but attaining a much greater size, the umbilicus much smaller in comparison with the diameter of the shell. Whorls $4\frac{3}{4}$ to 5, strongly lirate spirally. Aperture more lunate, embracing more of the preceding whorl, usually armed with a pair of small teeth within, as in *H. lineatus*. Umbilicus rather deep and cup-shaped. Alt. 1.9, diam. 4.8 mm., umbilicus 2 mm. wide.

Beaver Cave, near San Marcos, Hays Co., Texas.

This species was collected by Dr. C. H. Eigenmann, the well-known writer on fish morphology.

The specimens are very uniform in character, differing markedly from the common and wide-spread *H. lineatus*. The latter shows but little variation throughout its enormous range, and so far as I can see from a very large series, there is nowhere a tendency to become more narrowly umbilicated. The present form has been found only in the cave mentioned above, and may possibly be a modification induced by underground life, although until the immediate surroundings of the cave are searched, it would be unsafe to more than suggest this. I find only the ordinary *H. lineatus* from other Texan localities. Nothing like *H. Eigenmanni* occurred to me at San Antonio, New Braunfels, or Austin.

DESCRIPTION OF A LAND SHELL FROM SOUTH AMERICA.

BY C. F. ANCEY.

Eurytus Couturesi. Anc.

Testa ovata, tenuiuscula, subimperforata, nitidula, sub epidermide tenui virenti vel luteo-fusca, plus minusve decidua, sordide purpurea. Spira brevis, obtusa, apice fusco-purpurea, ad summum rotundate subconoidea. Anfractus 4, celeriter crescentes, convexiusculi, sutura impressa, striis incrementi notati et minute granulati; penultimus ad dextram tumidulus; ultimus post mediam partem longe deflexus, malleatus et minutissime granulosus, striis ad suturam pliculosis. Apertura fere verticalis, irregulariter ovalis, superne angulosa, plica columellari callosa prædita, intus livide purpurea. Peristoma undique revolutum et incrassatum, roseo-purpureum, marginibus callo nitido junctis, columellari ad insertionem paululum dilatato.

Long. 38, diam. 22, alt. apert. cum peristomate 22 mill.

Hab. Bolivia (teste G. Coutures).

This is more egg-shaped than either *E. pulicarius* or *E. cathcartiæ*, Reeve, which seem to be its immediate allies. In form it resembles *E. cardinalis* Pfr., from Quito, but is a smaller and much thinner shell. I have seen two specimens precisely alike, differing only in size; the larger one, the type, is in my collection.

DESCRIPTIONS OF NEW ASIATIC SPECIES.

BY C. F. ANCEY.

1. Limicolaria oviformis, Anc.

Testa obtecte minuteque rimata, obtuso-oblonga, solida, opacula, nitida, sub epidermide decidua pallide stramineo-lutescente, griseo-lactea strigisque pallide fuscis exilibusque in medianis aufractibus variegata vel flammulata. Spira oblonga, relative parum attenuata, apice valde obtusa. Anfractus 7 convexi, regulariter et lente crescentes, sutura satis impressa, subirregulari; striis incrementi aliisque spiralibus paulo inter se distantioribus regulariter decussata; ultimus

oblongus, rotundatus, post medium lævigatus (striis spiralibus evanidis). Apertura subobliqua, oblongo-angustata, albida. Columella reflexa, incrassata, fere recta. Peristoma rectum, acutum, margine extero antrorsum haud arcuato.

Long. 44, lat. 21, alt. apert. $18\frac{1}{4}$ mill.

Hab. Mountains above Aden, Arabia (Jousseume).

This is a *Limicolaria* of the typical African group and bears no relation to the species hitherto known from the opposite coast of the Somalis, like *L. Revoili*, Bourg., *Armandi*, Bourg., etc. It is remarkable in being very obtuse and of an oblong shape. The markings are but faint, at least as far as the original specimen is concerned.

2. *Buliminus* (*Petroëus*) *Pilsbryanus* Anc.

Bulimus Jousseumei, Bourg., in coll.; *not* *Buliminus Jousseumei*, E. A. Smith, Proc. Malac. Soc., Vol. I., part 4, p. 142 (1894).

Testa oblonga, clause rimata (rima obliqua, basi arcuata), candida, statu omnino recenti verisimiliter pallide luteotincta, solidiuscula, nitida. Spira conideo-oblonga, apice minuto, obtusiusculo, lævigato. Anfractus $7\frac{1}{4}$ convexiusculi, regulariter crescentes, sutura parum profunda discreti, superiores confertim oblique costulati, sculptura in sequentibus debiliore, in inferioribus obsolescenti et præterea lineis spiralibus numerosis indistinctis sub valida lenti passim impressa; ultimus postice convexus, ad dextram excentricus, versus aperturam breviter ascendens, circa rimam impressus et obtuse subangulatus. Apertura fere recta, superne oblique lunata, irregulariter subovata, ad dextram excentrica, ad marginem columellarum leviter oblique rectiuscula, extus valde convexa. Peristoma crassum, callosum, continuum, valide labiatum, planiusculum, latum, undique reflexum. Columella oblique recta, subsinuosa, intus plica valida in dentum acutum desinente munita. Margines approximati, callo crasso juncti.

Long. 21, lat $10\frac{1}{4}$, long. apert. (perist. incluso) 10; long. ejusd. (peristom. excluso $6\frac{1}{2}$); diam. ejusd. (peristom. incluso) 8; diam. ejusd. (sine peristomate) $4\frac{1}{3}$ mill.

Mountains of Yemen, above Aden, Southern Arabia (Dr. Jousseume).

SOME NAMES WHICH MUST BE DISCARDED.

BY WM. H. DALL.

In January, 1853, Gray (Brit. Mus. Cat. Brach., p. 114) instituted the genus *Cistella* for *Terebratula cuneata* of Risso and allied forms. This name has been generally adopted and, in the last revision of the Brachiopods by Schuchert, is not credited with any synonyms. But in 1848, Gistel, in his *Naturgeschichte des Thierreichs*, p. xi, proposed the name *Cistella* for a group of Insects. For the Brachiopod, therefore, I propose the name *Argyrotheca*, with the same type.

The name *Euryta* was proposed for a subgenus of *Terebra*, by H. and A. Adams in 1858, and is in general use, but *Euryta* had already been used for an acaleph by Gistel, in 1848, and must therefore be rejected. In its place I would propose *Mazatlanina*. In 1876 Jeffreys proposed *Glomus* for a remarkable bivalve allied to *Leda*, but he had also been preceded by Gistel, who had proposed the name *Glomus* for a beetle (*Naturg.* p. xi, 1848). The genus may take the name of *Pristigloma*.

The dismemberment of the heterogeneous Linnean genus *Patella* was one of the first tasks of naturalists after the publication of the *Systema Naturæ*. The first author to undertake this necessary work has been generally overlooked. This was Modeer, who in 1793 (*K. vetensk. Akad. nya Handl.* xiv, pp. 110–111) divided the true limpets from those with internal septa or processes and gave to the latter group, with a proper diagnosis, the name of *Cheilea*. This group was subsequently divided by authors who, however, omitted to reserve any portion of the original genus *Cheilea* to preserve the name, as required by the rules of nomenclature. On the five species cited as examples by Modeer, four genera were instituted by Humphrey (after Hwass) in 1797, two belonging to his genus *Crypta*, more generally known as *Crepidula*. In 1799 Lamarck made two subdivisions with new names for three of the species, and added a third in 1809. Ferussac added a synonym to one of Humphrey's names in 1807, and Schumacher did the same in 1817, while a subgeneric name was proposed by Mörch, for one of the two *Crepidulas*, in 1852. What name must we now reject, to reinstate

Cheilea in its rights? There was no diagnosis given with Humphrey's names, only lists of species. Passing them over, we find Lamarek eliminated *Crepidula* and *Calyptrea* with proper diagnoses, though his *Calyptrea* comprised species of two genera. He left behind a single species, which, if Lamarek had been the first to divide the genus, would have kept the name *Cheilea*. On the other hand, he included in his genus *Calyptrea*, a species he should have omitted. The first was named *Septaria* by Ferussac in 1807, and this left only one genus included in the original *Cheilea* unnamed. This was called *Mitrularia* by Schumacher in 1817, but in our opinion this name must be rejected for that of Modeer, which should be adopted for the group represented by the *Patella equestris* of Linnaeus.

PUBLICATIONS RECEIVED.

MOLLUSCA OF THE GREAT SMOKY MOUNTAINS. By Henry A. Pilsbry. Proc. Acad. Nat. Sci., Phila., 1900, pp. 110-150. This is the most interesting faunal list the writer has seen in a long while. It results from the explorations of Messrs. Pilsbry, Ferriss, Bryant Walker, Clapp and Sargent in July and August, 1899, along the Tennessee-North Carolina boundary, among the valleys and on the peaks of the Great Smoky Mountains. In all, fifty-six species of terrestrial mollusca were obtained, among which *Gastrodonta walkeri*, *Punctum blandianum*, and several varieties of different species are described as new. Two things are especially noticeable, one the abundance of endemic species and varieties, the other the absence of many species which one is accustomed to regard as universally distributed in the mountains of this continent. Of course more of the latter may yet be found, but it cannot be purely accidental that the party came upon no *Vitrina*, no *Pupa*, only one *Vertigo*, and that very rare, only one *Bifidaria*, also rare, and no *Vallonia*! In some cases widely-distributed species are represented by segregates which have attained specific rank; thus in place of *Vitrea indentata* there is an abundance of *V. carolinensis* of a small type (var. *wetherbyi*, Ckll. ined.) intermediate between *indentata* and *carolinensis* proper, the exact locality of which is unfortunately unknown. In the case

of *Polygyra tridentata* the differentiation has not gone so far, so that while Dr. Pilsbry describes a mountain race with a more or less double basal tooth, he hesitates to give it a name. Throughout the paper the author, while naming a number of local races, shows a natural reluctance to recognize in the nomenclature all the incipient species which his studies have brought to light. As with the mammals in the hands of Merriam, Allen, Rhoads and others, abundant specimens with exact data have proved what the older authors did not expect; that everywhere segregation is going on, and that the recognizable species and subspecies are far more numerous than we had been led to suppose. Lord Salisbury's statement of a few years ago, that nobody had seen evolution actually going on in nature, appears absurd to the modern zoölogist or botanist. Even the attitude of those who do not believe in varietal nomenclature or the recognition of subspecies has changed. Thus Dr. Skinner, who from sundry published opinions might be regarded as a "lumper," is familiar with and has represented in his splendid collection of butterflies more geographical races than entomologists dream of; and I believe he will admit that if he were converted to the policy of splitting, he might produce a work which would astonish us all.

The writer of this notice believes that detailed studies like those of Dr. Pilsbry are of the highest importance from a philosophical point of view, and that until zoölogists are prepared to recognize the wonderful complexity and variety of living forms, they cannot hope to understand the larger problems of biology. And it seems to him, furthermore, that we should be rational enough to weigh and consider all characters, not merely those which strike the eye. We think of the Sandwich Island Achatinellidæ as being wonderfully diverse, because their diversity is largely that of bright colors and pretty patterns. Why may not the less conspicuous diversity of our simply-colored snails be just as real, and just as worthy of recognition by students of molluscan life?

T. D. A. COCKERELL.

THE ARMATURE OF HELICOID LAND SHELLS, by G. K. Gude (Science Gossip). Mr. Gude has now brought to completion his long series of articles on the genera *Plectopylis* and *Corilla*, giving a synopsis and key to the former group, a discussion of its geographic

range, and a much-needed index, as the papers extend over a period of several years. A classification into seven sections is offered. These seem in all cases to be excellently founded groups, and decidedly useful in classifying some 75 species which now compose the genus. Few if any groups of *Helices* of similar extent have been so well monographed. The workman-like manner of the performance shows Mr. Gude to be an acute observer and clear expositor. He is a welcome recruit to the first rank of Helicologists.

LIST OF SHELLS collected by Vernon Bailey in Heron and Eagle Lakes, Minnesota, with notes. Proc. U. S. Nat. Mus. XXII, p. 135-138. DESCRIPTION OF A NEW VARIETY OF *HALIOTIS* FROM CALIFORNIA, with faunal and geographical notes. Proc. U. S. Nat. Mus. XXII, pp. 139-142. By R. E. C. Stearns, Ph. D. The first list enumerates some 18 species, all aquatic except *Succinea ovalis* Gld., reported from the shore of Heron Lake. A number of noteworthy variations of *Limmæa emarginata* from Eagle Lake are discussed, shouldered, lirate, patulous and variously distorted forms occurring. The second paper describes *Haliotis fulgens walallensis* (Nautilus, XII, no. 9).

GENERAL NOTES.

SHELLS OF LAS VEGAS, N. M.—We have received from Prof. T. D. A. Cockerell another small lot from this locality, collected by Miss Mary Cooper, and including the following species: *Vitrina pfeifferi* Newc. *Pupoides hordaceus* (Gabb). *Bifidaria armifera* (Say). *Bifidaria procera* (Gld.). *Pupa blandi* (Morse). *Planorbis deflectus* Say. *Pisidium compressum* Pme.

Dr. Rudolph Bergh discusses the anatomy of various Tectibranches in the part of the *Malacologische Untersuchungen*, Vol. VII., just issued. He adopts the erroneous spelling *Haminæa* for *Haminea*, and retains it in the *Bullidæ*, where it does not belong. An excellent account of the anatomy of *H. cornea* Lam. follows. *Cryptophthalmus* follows, also referred to the *Bullidæ*, and the anatomy is now first described. The genus *Chelidomura* is described anatomically, and referred for the first time to the family *Doridiidæ*, doubtless correctly. This is a most interesting discovery. The

genera *Lobiger* and *Lophocercus* are then discussed. The anatomy of *Akera bullata* and of a new Pacific species of *Phyllaplysia* is also described.

NOTE ON A NEW ABYSSAL LIMPET. Under the name of *Bathysciadium conicum* Dautzenberg and H. Fischer have described* a new deep-water limpet which combines some curious characters. The specimens are simply conical with radiating riblets and an almost membraneous shell, and have a diameter of 1.5 mm. and a height of 0.9 mm. Some anatomical details are given by Dr. Pelseneer in a note appended to the description. The animal was obtained from the beak of a cuttlefish dredged by the Prince of Monaco off the Azores in 843 fathoms.

Like *Lepeta* it is without eyes or ctenidia, the respiration being carried on by the surface of the mantle. The muzzle appears to be without lappets, the right tentacle has an appendix like that of *Cocculina* (supposed to be a degenerate verge), there are no posterior filaments; an unpaired mandible and long radula are present, the nervous system is that of the Docoglossa, and the otoliths are single.

Dr. Pelseneer regards the genital gland (otherwise strictly decoglossate) as hermaphrodite, a condition so exceptional, and, considering the minute size of the animal, so difficult to determine, that judgment may fairly be suspended pending further confirmation of it. The radula as figured leads to the belief that except in the absence of the rhachidian tooth (often degenerate in abyssal limpets) the teeth are like those of *Lepetella*; the major lateral being broken into three pieces which have been taken for three separate teeth by the author cited. If this suspicion be correct, the formula is $1 + 2.0.2 + 1$, for a transverse series of the radula. The creature will be the first true limpet (Docoglossa) to show any trace of a verge, and if really hermaphrodite, the first to exhibit this character. The single otolith is very likely correlated with the small size of the animal. The genus will stand next to *Lepetella* among the Abranchiate Docoglossa.—WM. H. DALL, (*Science*, June 8).

* Bull. Soc. Zoöl. de France, xxiv., p. 207.

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THE GREAT SMOKY MOUNTAINS.

BY JAMES H. FERRISS.

There was a general round-up of the snails in the Smokies last summer. When the roll of diggers was called at Cades Cove, Dr. H. A. Pilsbry answered to his name, and so did Geo. H. Clapp, of Pittsburg, Bryant Walker, of Detroit, Prof. H. A. Sargent, of Ann Arbor, and I did too. Prof. A. G. Wetherby and Mrs. M. L. Andrews intended to be with our party until the very last moment. The year before, I made the trip as far as Mirey Ridge with Mr. Clapp. With this exception it was my first excursion in company with up-to-date scientists. I have made four trips to the Smoky Mountains and expect to go again this year. On two occasions short stops were made at Burnside, Kentucky, on the Cumberland; at Oakdale, Tennessee, on the Emery; Lookout Mountain, at Chattanooga, and a side trip to the Little Tennessee, at Caringer post-office, or Talassee Ford, and one trip was made into the Unaka range. The Smoky Mountains on the north of the Little Tennessee and the Unaka range on the south (not the Unakas near Roan Mountain), form the boundary between Tennessee and North Carolina.

The readers of the NAUTILUS, I am sure, will be pleased to know something of this party. Briefly in ages, its members ran from 35 to 50; at least I am that high, but they are boys still, and can climb more trees and wade streams worse than ever. Mr. Walker, an attorney, and Mr. Clapp, a business man, I think the handsomest members of the party; and their dispositions, their patience, their interest in the comfort of others really approach the domain of the

angels, and when Mr. Blair, our mountain host, was with the party it made three of them. Mr. Clapp can suffer more and complain less than any entirely earthly being. When lame enough to put an ordinary man in a hospital he will sprinkle on a little talcum powder, keep up with the procession and never say a word. Mr. Walker did not sleep the night after our party separated because Sargent and I were out on the mountains without blankets, and the heathen, the two of us, at that very time were as near the happy hunting grounds, both in altitude and spirit, as we may ever be; with a bed of dry moss and a roaring fire at our feet, we slept sweetly as doves, under a massive balsam in the prettiest park I ever saw in the mountains. The next morning we got over 80 *Polygyra Ferrissi* each, and three were albinos.

For industry, zeal and business (shell business), Sargent and Pilsbry are not to be excelled. Sargent always hunts longer and gets more than any other, and Pilsbry, after a hard day's digging, was ready to clean up my catch any time I would bake biscuit. Not one was a believer in ghosts. It was the most sensible, kindly, lovable collection possible. A sad day came when the company separated. Dr. Pilsbry then borrowed soda of a herder and attempted to bake his own biscuit. He did not have any sour milk, and I think that yellow spot remains in the camp site to-day, a wonder to passing herders and a puzzle to those practical mountain scientists who condense their bulky corn crop into convenient form for transportation in jugs.

Cade's Cove, in Blount county, Tennessee, lying at the base of the Smokies, is 1,700 feet above the sea. It is six miles long, in some places two in width, and out of this valley are many other deep coves running up to the top of Boat and Rich mountains, 3,500 feet above the sea. This valley has been searched more than any we have visited. But last year we found four more kinds, and one of those a new variety. The soil is so fertile in shells, like the sea coast of Florida it will be good ground for many years.

With mountain friends, camp dunnage and mules, we left the settlement soon as possible. There was much rain, and the puncheons in the herder's cabin where we slept the first two nights were very hard, but it was a light-hearted company. There were plenty of snails, and school children were never more delighted or delightful. The pleasant days we climbed the mountain sides, when Mr. Pilsbry

and company talked snails, geology, botany and fungi, is a memory will long live pleasantly with your humble author.

Thunderhead is 5,500 feet according to the government maps, and it rains there every week in my experience and it is more storm-swept than many of the higher peaks. The beech trees and buck-eyes are mere scrubs. Blockhouse mountain, of the same height, Coontown, Russell's field and other good coves were hunted over from the first camp. Then we moved along the backbone of the range to Clingman's Dome, some 15 miles farther, passing Briar Knob, the Derricks, Mirey Ridge, Siler's Bald and the Balsam, all over a mile high, and good collecting ground.

Clingman's Dome is 6,600 feet high, covered with balsam fir, and the sphagnum is so deep walking is like tramping on a spring mattress, and very tiresome. When away from a well-beaten trail it is difficult to walk a mile in less than an hour or an hour and a half. Many of the rocks were large as houses, and when we went under for rare shells we carried candles. These feed on the microscopic fungi, I suspect, growing upon the roof, and they seemed to select a roof nearly level. One of the *P. ferrissi* at a time is the rule, but on Andrews Bald, afterwards, we sometimes found as many as eight on one roof. Occasionally *P. clarkii*, *andrewsæ altivaga*, *depilata*, or a *Gastrodonta lamellidens* or *clappii*, would be found on the same roof, but not often.

Bidding the remainder of our party and the mules farewell, as our vacation was longer. Prof. Sargent and I, with a couple of mountain friends, carrying our camp outfit upon our backs, parted company from Pilsbry, Walker and Clapp, and made a trip to Andrews Bald (5,900 feet) from Clingman, though we really started out for Mt. Collins, some 600 feet higher. On Andrews, besides *ferrissi*, we found our finest red *andrewsæ altivaga*, banded with a still darker band.

The next day we retraced our steps over Clingman and the Balsam to Siler's Bald, where we took the Welsh Bald trail and continued in a southwesterly direction in North Carolina for the next three weeks, with the exception of the two last days. Sometimes we were on the trail all day, while on other days we went only a mile or two. Sometimes we stayed several days in one place. The weather man furnished his best, and only twice were we compelled to build bark shelters to keep us dry.

On Welsh Bald, at an altitude of 5,000 feet, we first found the new variety of *Polygyra edwardsii*, and from a little spring that oozed out from near the top, we found *Pisidium roperi* Sterki. Sargent found this in Minnesota and I had found it in a small pool near Joliet, but the shell is still rare.

We descended to Chambers' Creek one hot afternoon, where it was only 1,500 above the sea. It was a tough slide and both of our mountain friends were sick before starting. From there Sargent made a side trip by rail to Hayesville, N. C., and I first found *Poly. monodon cincta*. And then and afterwards they were mostly dead and found around the basswood and buckeye trees. After a few days' rest, we crossed over to Tuskegee Creek, and in Ramp Cove, on the Tuskegee side of the Yellow Creek Mountains, we first found *Gastrodonta Walkeri* Pilsbry, a new species. It was in company with *significans*. These mountains run up about 4,000 feet, with soil on the slopes rich as a garden.

Passing down Yellow Creek, between the Cheowah and Yellow Creek Mountains, we loaded up with green corn, sweet potatoes and other good things, as the valley is settled. Here we discovered that *Poly. christyi* has a great fondness for the shrub called poison hemlock. The streams were swift and rocky. We found no clams and very few univalves.

At Cheowah river we were down to 1,500 feet again. Hangover and Mount Hayo, in the Unaka range, 5,200 feet, overlook the ford, and the trail we took to these peaks was up a dry pine ridge, steep as the roof of a house, and for the first time in our trip, good drinking water was a little scarce. It took us until 3 o'clock in the afternoon to get up, and all were sore and some were cross.

Every day brought new delights. One afternoon, on Bob Stratton's Bald, 5,400 feet (there is another peak a few miles away called John Stratton's Bald), near Hayo, we found over 200 *G. lamellidens*. We found these in company with *Helicodiscus lineatus*, and *Vitrea carolinensis*, by turning over slabs of stone that lay on top of the ground, and there were sometimes a half a dozen under one stone. The general rule is one *lamellidens* to a dozen or two rocks. The next day, at Glen Cove, a couple of miles lower down the range, we found 130 *Poly. chilloweensis*. Back on the Little Tennessee river again at Talassee ford, we again found *Gastro. walkeri* at a point less than 1,000 feet above the sea—the lowest point in our trip. One of the

mules and a good walker came to our rescue at Talassee ford and we returned to Cade's Cove, 25 miles in a day. In all we traveled about 150 miles, as measured in a straight line, besides our side trips.

There is much land for the snail hunter here. From the highest peaks we could see mountains 125 miles distant, and it was all mountains as far as we could see in three directions, and over much of this roughness no specimen hunter has traveled.

In the proceedings of the Academy of Sciences of Philadelphia, Dr. Pilsbry has given one of his best reports on the shells of this region. I will, therefore, give merely the list with little more than locality. A number of varieties have been added by Mr. Pilsbry, but not enough.

10. *Helicina occulta* (Say). Rowan Creek in Cade's Cove, $5\frac{1}{2}$ mm., farthest record south.

67. *Poly. pustuloides* (Bld.). Talassee Ford, 2 first trip.

90. *Poly. tridentata* (Say). A double-toothed variety. Rose flats in Cade's Cove, Welsh Bald, Talassee Ford.

91. *Poly. fraudulentata* (Pils.). One only, 13 mm. Welsh Bald, Swain Co., N. C.

96. *Poly. rugeli* (Shuttl.). Everywhere 9 to 15 mm. (Two kinds here sure, the big one is a dirty fellow.)

97. *Poly. inflecta* (Say). Tuckaleeche Cove.

105. *Poly. profunda* (Say). One on Slick Rock Creek in the Unakas in 1898.

106a. *Poly. chillhoweensis* (Lewis). Cade's Cove, Block House, Mirey Ridge, Clingman's Dome, Yellow Creek Mountains, Unakas, Talassee Ford, $27\frac{1}{2}$ to 40 mm.

109. *Poly. albolabris* (Say). Rose Flats in Cade's Cove, Yellow Creek, Cheowah Mountain, 3,400 ft., Cheowah River, Slick Rock Creek (Monroe County, Tenn.). Found in dry situations, dry mountain tops, 32 to 35 mm.

110. *Poly. exoleta* (Binn.). Cade's Cove, Thunderhead, Glen Cove, Talassee Ford.

116. *Poly. ferrissi* (Pils.). Mirey Ridge, Clingman, Andrew's Bald, Welsh Bald. We found only three in two days on Welsh Bald, but got 160 in half a day on Andrew's. I offered to exchange a dozen of these shells with a dealer at the rate of \$6 per dozen. After we had been in Ferrissi territory a couple of days my expert brethren held a council of war and called me down. They said the price

should certainly be high as a dollar each. The next day they raised it to \$3 and before we parted they said, taking the rarity and beauty of the shell and the difficulties of finding it all into consideration, the price should be \$5 and railroad fare paid to the spot. Our experience at Andrews would tend to lower this price, but Andrews is 25 miles from civilization, the miles are wild ones, and whoever starts out to hunt *ferrissi* on speculation, I still believe will earn his money.

118. *Poly. palliata* (Say). Cade's Cove, Russell Field, Chamber's Creek, Tuskegee Creek, Slick Rock Creek, Talassee Ford.

119d. *Poly. appressa perigrapta* (Pils.) all along the route.

121. *Poly. clarki* (Lea). General in deep coves but sparingly, 18mm.

123a. *Poly. andrewsæ normalis* n. var. (Pils.). Mr. Pilsbry has added two varieties to *andrewsæ* and some day there may be others. Those on Thunderhead (*altivaga*) approached the small, thin, greenish, smoky type, but many are banded. They measure 22 to 24 diameter. The types I have from Roan Mountain are 20 to 23. *Normalis* finds its way to the lower altitudes, 1,000 ft., and apparently thrives as well as upon Mirey Ridge or Bobs Bald, and it is quite generally distributed—Cade's, Welsh Bald, Chamber's Creek, Tuskegee, Yellow Creek, Slick Rock, Citico Creek and Talassee Ford. It has been white or russet colored so far, and the largest with the highest spires were found on Mirey Ridge at an elevation of 4,500 and on Citico Creek at 3,000. The largest measures 40 mm. diameter, 25 altitude (Citico), 38½ diameter, 24 altitude (Mirey). Usually 31 to 35 diameter, occasionally with a small tooth on parietal wall. Sociable and active. The best traveler in the range.

123b. *Poly. andrewsæ altivaga* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome, Andrew's Bald. We did not find this after leaving this range, and it was always at the mountain top or the nearest basswood and buckeye belt, under stones or moss. On Mirey Ridge only, it occupies the same territory with *normalis*, but not often found in the grass or in the open. Unless further divided its colors are white, greenish or smoky white, cherry red, and both colors sometimes banded with a darker red band as in *profunda*. Sometimes there is an additional line at the suture and some are half and half, dark above and light below. (Mirey, N. C. side.) 22 to

25 diam. Largest red colored forms were found on Andrews but our stay was short and we found but few. This variety is more often toothed than normalis. In some localities 43 per cent. had teeth on the parietal wall. About $\frac{1}{2}$ are banded. On one slope of Mirey Ridge all were white, upon another all half and half, and upon another a fourth were red, the others white and banded. Upon Clingman and Andrews the choice "redii" were the most common. This variety furnishes the most entertainment and has caused more shouting and singing and expressions of joy and perplexity of any in the Smokies.

124. *Poly. thyroides* (Say). Welsh Bald, Chamber's Creek, Talassee Ford.

125. *Poly. clausa* (Say). Talassee Ford.

126. *Poly. wheateleyi* (Bld). All along the route in very damp situations.

This is the most variable shell of this region. At Cade's the measurements were 16 to 18 mm. diam. All dentate, all hirsute, large flaring lip and a few were albinos. The same measurements prevailed at Block House. On Clingman they dropped back to 13 and 14 diam. and some were not toothed or hirsute and quite globose, with narrow lip. At Welsh Bald we found part of both. At Tuskegee and Cheowah all were small and only partially dentate or hirsute. Ascending Mt. Hayo, we again found the 13 mm. variety up the sides and at the top. Two miles further we found on Bobs Bald a large variety I first supposed to be *ferrissii*. It was not hirsute but deeply sculptured and 2 or 3 were dentate. 23 mm. On our return to Cade's in Brannon's Cove, we again found the small globose form, the smallest being only 12 mm.

127. *Poly. christyi* (Bld.). Cade's Cove, Tuskegee Creek, Cheowah river, in flat ground near streams.

136a. *Poly. edwardsi magnifumosa* (Pils.). n. var. Welsh Bald, Chambers' Creek, Tuskegee Creek, Mt. Hayo, Glen Cove. Mr. Sargent also found this at Hayesville, N. C.

138. *Poly. stenotrema* (Fer.). Cade's, Welsh Creek and south of Little Tennessee. At Chambers' Creek south side of Little Tennessee and at Talassee Ford we found it measuring 13 mm.

138b. *Poly. depilata* (Pils.). Cade's, Thunderhead, Mirey Ridge, Clingman, Andrew's Bald and Bobs Bald. Under moss and stones.

139a. *Poly. hirsuta pilula* (Pils.). n. var. Cade's Cove and

Thunderhead only. Do not remember of ever finding the typical *hirsuta* in these mountains.

141c. *Poly. monodon cincta* (Lewis). Tuskegee Creek, Yellow Creek, Mt. Hayo, Glen Cove, Talassee Ford.

180a. *Strobilops labyrinthica strebeli* (Pfr.). Cade's Cove, Yellow Creek Mountains.

187. *Bifidaria contracta* (Say). Cade's Cove.

194. *Bifidaria corticaria* (Say). Cade's Cove.

225. *Vertigo gouldii* (Bid.). Cade's Cove.

226. *Vertigo bollesiana* (Morse). Cade's Cove. These four species very rare.

235. *Cochlicopa lubrica* (Mull). Sugar Cove in Cade's. One specimen by Sargent.

239. *Circinaria concava* (Say). General. Largest $23\frac{1}{2}$ diam.

246a. *Omphalina fuliginosa polita* (Pils.). Cade's Cove, Coontown, Chambers' Creek, Talassee Ford. At the two last named places on the Little Tennessee the shells were as light colored as the typical *fuliginosa*, but polished. There were no black forms at these points.

248. *Omphalina laevigata* (Pfr.). Cade's Cove, Cheowah river. Only a few found at the latter place and these were dark colored and as well polished nearly as *Omp. Andrewsæ*. Largest 20 mm. diam., 12 altitude.

248a. *Omp. laevigata perlævis* (Pils.). n. var. Talassee Ford.

248b. *Omphalina laevigata latior* (Pils.). n. var. This variety has given me trouble since I saw it on my first trip to Tennessee. It is much larger than type, much depressed and a light "Melantho" blue in color. As I read shell music by ear, it has very little resemblance to the typical form. The largest from Talassee Ford measured 28 diam., 10 altitude. Also found at Chambers' Creek.

250. *Omphalina subplana* (Binn). All along the route in damp moss. On the Unakes the shells were very fragile, sometimes the shell was a mere membrane but large and healthy otherwise. It is as much of a cannibal as *concava*. Largest (Mt. Hayo) 24 diam., 10 altitude.

252. *Omphalina andrewsæ* (Pils.). All along the route. In Cade's Cove there is a light colored form, faintly banded with darker color. Largest 18 mm. in diam. 16 is large.

252a. *Omp. Andrewsæ montivaga* (Pils.). Cade's Cove, Mirey

Ridge, Welsh Bald, Mt. Hayo. Largest $20\frac{1}{2}$ greatest diam., 16 smallest diam.

253. *Vitrinizonites latissimus* (Lewis). Cade's Cove, Block House, Thunderhead, Mirey Ridge, Siler's Bald, Balsam, Clingman, Andrew's Bald, Welsh Bald, Mt. Hayo, moss and stones.

253a. *Vitrinizonites latissimus uvidermis* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome. These two often associate with the above, but not always. It is more active in its habits. The elastic shell is so thin our specimens collapsed, and in fact the shell is worn indented and crushed in by its rightful owner. It is darker and larger than the type. The largest are 19 greatest diam.

263a. *Vitrea petrophila pentadelphia* (Pils.). n. var. Named after the five of us. At Cade's Cove, Cheowah River and Bob's Bald; found by mining.

270. *Vitrea indentata* (Say). Cade's Cove. Greatest diam. 5 mm.

271. *Vit. sculptilis* (Bld.). At nearly all points high or low, but never abundant. It is one of the most beautiful of mountain shells, being a warm pink in color, but from improper handling, perhaps, this beautiful tint fades away. Largest 10 diam. Binney reports $12\frac{1}{2}$.

272. *Vit. carolinensis* (Ckll.). Generally distributed along the route, under rocks; a brigadier indentatus. Largest $8\frac{1}{2}$, found by Mr. Clapp on Mirey Ridge.

274. *Vit. capsella* (Gld). Cade's Cove, Chambers' Creek.

276. *Vit. capsella placentula* (Shuttl.). Cade's Cove.

278. *Conulus chersinus* (Say). Cade's Cove, 3 in 1898.

283. *Zonitoides arboreus* (Say). As far as Tuskegee river and again at Talassee Ford.

287. *Z. patuloides* (Pils.). Cade's Cove, very sparingly.

295. *Gastrodonta intertexta* (Binn.). Cade's Cove, Mirey Ridge, Welsh Bald, Chambers' Creek, Yellow Creek Mts., Tallassee Ford. Largest 17 diam. Never plentiful, fond of poison hemlock; sometimes albino as all these mountain shells seem to be.

296. *Gastro. acerra* (Lewis). One of the common kind all along the road. It shows much variation without change of locality. My largest is 18 diam., $10\frac{1}{2}$ alt. Another of only 17 diam. is $13\frac{1}{2}$ in alt.

297. *Gastro. demissa* (Binn.). Cade's Cove.

301. *Gastro. gularis* (Say). Common on the route.

302. *Gastro. suppressa* (Say). Brannan's Cove and Chestnut Flats in Cade's Cove, Chambers' Creek.

305. *Gastro. elliotti* (Redf.). General but not plentiful.

306. *Gastro. interna* (Say). Welsh Bald and south of Little Tennessee, plentiful.

307. *Gastro. significans* (Bld). Cade's Cove, Yellow Creek Mts.

309. *Gastro. multidentata* (Binn.). Talassee Ford, found one first trip.

310. *Gastro. lamellidens* (Pils.). Thunderhead Block House, Coontown, Mirey Ridge, Clingman, Cheowah River, Bobs Bald. 4 mm.

310-1. *Gastro. Clappi* (Pils.) Thunderhead, Block House, Mirey Ridge, Clingman.

310-2. *Gastro. Walkeri* (Pils.). n. sp. Cheowah river, Yellow Creek Mts., Talassee Ford. Diam. 29, altitude 1.45.

The last five belong to the *Taxeodonta* group; the other member, *andrewsae*, is found at Roan Mt., about 75 miles east of Clingman.

338. *Pyramidula alternata* (Say). Andrew's Bald, Chambers' Creek, Yellow Cr. Mts., Yellow Creek and Unaka range; depressed and small. 18 mm. At Cade's two were found of the Knoxville type, large, whorls round and epidermis crinkled. 25 mm.

338b. *Pyr. alternata costata* (Lewis). Cade's Cove and Thunderhead only. 20 mm.

342. *Pyr. perspectiva* (Say). Common, large and toothed. 10 mm.

346. *Helicodiscus lineatus*, Cade's Cove, Mirey Ridge, Tuskegee Mts., Bob's Bald.

347. *Helicodiscus fimbriatus* (Weth.). Talassee ford, two first trip.

348. *Punctum Blandianum* (Pils.). n. sp. Found by Mr. Clapp, in 1898, on a tulip tree stump at Brannon's in Cade's Cove. These stumps beginning to decay, make fine feeding ground for little fellows.

362. *Succinea obliqua* (Say). On the very top of Thunderhead, Mirey Ridge and Clingman.

Goniobasis saffordi (Lea). Chambers' Creek.

Goniobasis proxima (Say). Welsh Bald branch. Tuskegee Creek.

Pleurocera trivittatum (Lea). Talassee Ford.

Pisidium roperi (Sterki). Welsh Bald.

Between Knoxville and Cade's Cove, 35 miles, the following are found, *Poly. elevata*, form *cineta*, Taylor; *Poly. spinosa* (Lea); *Omphalina kopnodes* (W. G. Bin.); *Gastrodonta macilenta* (Shuttl.) and *Pyr. Bryant* (Harper).

A NEW PHILOMYCUS.

BY T. D. A. COCKERELL.

***Philomycus secretus* n. sp.**

Length (in alcohol) 12 mm. Mantle very dark grey, with numerous small black spots, best seen at the sides. Body pallid, sole whitish with an ochreous tint.

Jaw light yellow, arched, with five strong ribs in the middle, nearly the outer thirds being ribless. Teeth 9-11-13-1-13-11-9. The side cusps on both centrals and laterals are very small. Penis-sac as Binney describes for *P. hemphilli*.

Hab.—Roan Mtn., Mitchell Co., North Carolina. (A. G. Wetherby.)

Mr. Wetherby sent me two specimens with these remarks: "A small slug found here which I am quite sure has never been described. It is never larger than these specimens; lives deep down in drifts of damp leaves, and never comes to the surface so far as my careful observation of it for the last ten years goes to show. It is "sluggish" in its habits; about all it will do when brought to the light is to cautiously protrude its very short tentacles." (Litt., March 22, 1899.)

By its jaw characters, this resembles only *P. hemphilli*. From that, as described by Binney, it differs mainly in being only half the size. Mr. Wetherby knows both species, and states that the present animal is uniformly small; further, although I was not able to make a satisfactory examination of the anatomy, the genital organs appear to be fully developed.

ON SOME JAPANESE LAND SNAILS.

BY H. A. PILSBRY.

In a former paper on Japanese snails, I identified a species of *Julista* from Ushika, prov. Teshio, with the *Helix læta* of Gould, but

that name being pre-occupied, I gave the new name *Eulota gainesi* to my specimens. Further study of the group with more material, and notes on the type specimen of *læta*, kindly supplied by Prof. Dall, shows that *E. gainesi* is perfectly distinct from *læta*.

I propose now to designate as *E. gudeana* n. sp., a large greenish species, also from Ushika, Teshio prov., Hokkaido, which has somewhat the aspect of *Natalina caffra*, and which differs from *E. gainesi* in the broader form, less plicate surface, and the peristome, which is barely everted outwardly, becoming expanded below and reflexed at the columella, whorls 5.

Alt. $27\frac{1}{2}$, diam. 37 mm.

I regard *Helix læta* Gld. (not Pfr.) as a less-developed race of this species; and the name being pre-occupied, I propose to call this Hakodate form *Eulota gudeana hakodatensis*. It is more fragile than *gudeana*, smaller, diam. about 26 mm., and yellowish-brown, with two brown bands above. Types of *E. gainesi*, *E. gudeana* and *E. g. hakodatensis* are in the collection of the Academy.

Figures of these several species and races will appear in the Proceedings of the Academy of Natural Sciences.

***Eulota callizona dixonii* n. var.**

Shell rather narrowly umbilicate, globose-pyramidal with high-conic spire, rather thin and smooth; greenish-corneous, usually with a black brown peripheral band, a narrower subsutural band, and a large basal patch formed of the united basal band and umbilical patch. Aperture rounded-lanate, oblique, the lip broadly expanded, thickened within, reflexed below, purplish flesh colored, and at the terminations of the bands purple-black. Alt. $32\frac{1}{2}$, diam. 33 mm.

Inga, prov. Hoki, in southwestern Hondo. Type no. 76263 coll. A. N. S. Phila.

This form has hitherto been erroneously united to *E. callizona* Crosse, or *E. amaliæ* Kobelt. The latter is probably nearest, its area of distribution lying chiefly northeast of that of *dixonii*, while *E. callizona* is undoubtedly the northern fringe, so to speak, of the *amaliæ* stock, and came in all probability from the Hakone region.

A small form before me from Hagi, Nagato Province, is clearly related genetically to *dixonii*, and not referable to *callizona*.

GENERAL NOTES.

Apropos of the note on *Bathysciadium* in the last number (p. 48), it might be well to state that Prof. Wilcox found *Acmæa fragilis* of New Zealand to be hermaphrodite, and exceptional specimens of another species have also been stated to have both male and female reproductive organs. These facts render the case of *Bathysciadium* less exceptional. It is noteworthy that the deep-water limpets, like the Chitons, belong to the lowest groups in their respective orders.

THE NAUTILUS.

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No. 6.

CATALOGUE OF SPECIES OF THE GENUS PHENACOLEPAS, PILSBRY.

BY HENRY A. PILSBRY.

Some years ago I compiled a list of the species of this genus with a view to writing a more complete monograph than that in the Manual of Conchology. Other work preventing this undertaking, I think it may prove useful to publish the mere list of species described up to 1900, with appropriate references, and the original localities. Most of the species were originally described as *Scutellina*, a pre-occupied name which I changed as above (NAUTILUS V, p. 88, Dec., 1891). The arrangement of species in this list is chronological, and each is given under its original generic name.

1819. *Patella galathea* Lamarck, Anim. s. Vert., vi, pt. 1, p. 534; Delessert, Rec. de Coq., pl. 23, f. 10.

1834. *Scutella crenulata* Broderip, P. Z. S., 1834, p. 48. Chain Island, S. Pacific. See also P. Z. S., 1865, p. 197 (Formosa).

1846. *Patella cinnamomea* Gould, Proc. Bost. Soc. N. H., ii, 151; U. S. Expl. Exped. Moll., p. 345, f. 449. New South Wales.

1852. *Crepidula osculans* C. B. Adams, Catal. Shells Panama, p. 234. Panama.

1854. *Scutellina arabica* Rüppell, H. & A. Adams, Gen. Rec. Moll., i, p. 461 (nude name), iii, pl. 52, f. 6b.

1854. *Scutellina ferruginea* A. Adams, Genera i, 461; iii, pl. 52, f. 6, 6a = *P. cinnamomea* Gld., teste Angas, Smith and Brazier.

1854. *Scutellina asperulata* A. Ad., Genera i, 461 (nude name). = *P. galathea* (Lam.), teste E. A. Smith.

1854. *Scutellina costata* A. Ad., Genera i, 461 (nude name) = *P. galathea* (Lam.), teste E. A. Smith.

1854. *Scutellina elongata* A. Ad., Genera i, 461 (nude name).

1854. *Scutellina granulosa* A. Ad., Genera i, 461 (nude name).

1854. *Scutellina lævicostalis* A. Ad., Genera i, 461 (nude name).

1855. *Scutellina navicelloides* Carpenter, Mazat. Catal., p. 211. Mazatlan. = *P. osculans* (C. B. Ad.), teste Carpenter, P. Z. S., 1863, p. 361.

1857. *Acmaea hamillei* Fischer, Journ. de Conchyl., v, 1857, p. 277; 1872, p. 145, pl. 5, f. 6. Guadelupe, French West Indies.

1859. *Scutellina unguiformis* Gould, Proc. Bost. Soc. N. H., vii, 162. Kagosima, Japan.

1859. *Scutellina scobinata* Gould, t. c., p. 162. Oosima, Japan.

1860. *Scutellina cancellata* Pease, P. Z. S., 1860, p. 437. Sandwich Is. Mr. D. Thaanum has found this species at Hilo, Hawaii.

1868. *Scutellina compressa* Pease, Amer. Journ. of Conch., iv, 99. Tahiti.

1868. *Scutellina granocostata* Pease, t. c., p. 100. Hawaii.

1868. *Scutellina aculeata* Pease, t. c., p. 100. Hawaii.

1871. *Scutellina pulchella* Lischke, Mal. Blätter xviii, p. 41; Jap. Meeres-Conchyl. ii, p. 100, pl. 6, f. 20-23. Nagasaki, Japan.

1877. *Scutellina squamosa* Garrett in Catal. Mus. Godeffroy, vi, p. 91, no. 11030, Viti Is., no description, probably = *P. galathea* Lam.

1882. *Scutellina fischeri* Rochebrune, Bull. Soc. Philomathique, 1881, p. 29; Nouv. Arch. du Mus. IV, 1881, p. 269, pl. 18, f. 9. Santiago, Cape Verde Is.

1890. *Scutellina antillarum* Shuttlw. in Dall, Blake Gastrop., p. 342, pl. 31, f. 10, 11. Key West, Fla. = *Phenacolepas hamillei* (Fischer), see Man. Conch. xiii, p. 36.

1899. *Phenacolepas senta* Hedley, Mem. Australian Museum, iii, pl. 7, p. 403, fig. 1 (March 9, 1899). Fnnafuti.

1899. *Phenacolepas linguaviverræ* Melvill & Standen, Linn. Soc. Journ. Zool., xxvii, 179, pl. 10, f. 11. Torres Straits.

Mr. E. A. Smith kindly examined the specimens in the British Museum, where the types of Adams' undescribed species are preserved, and writes that he regards *S. elongata*, *granulosa* and *lævicostalis* as well as *arabica* Rüpp., as distinct species, but *asperulata* and *costata* are identical with *galathea*.

There seem to be about 15 valid species, not counting Adams' undescribed forms. The largest is *Phenacolepas galathea* Lam., of the South Pacific.

LAND MOLLUSCA OF KENNEBUNKPORT, ME.

BY GEORGE H. CLAPP.

The collection was made during the months of July and August of this year. Most of the shells were found in the woods back of the "Casino" and extending from there to the ocean. The timber is principally pine and spruce, with a few deciduous trees around the edge of the woods and in swampy places. The best collecting ground was in a small group of oaks and beeches at one corner of the woods, and it was here that *Polygyra sayii* and most of the *Pupidae* were found. The only species found everywhere through the woods were *Zonitoides arboreus* and *Pyramidula striatella*. In no place were shells plentiful; it was a case of collecting one at a time, rarely two or three under the same stick or piece of bark.

As the country rock is granite the mollusks probably get their lime from the marine shells and "carapaces" of crabs (the common shore-crab, *Cancer irroratus* (?)) which are scattered all through the woods. I noted the following species: *Mytilus edulis* L., *Modiola modiolus* L., *Mya arenaria* L., *Lunatia heros* Say, *Buccinum undatum* L.

On wet days one or more mollusks would be found "feeding" on nearly every dead shell. *Polygyra albolabris* appears to be particularly fond of the crab shells. The scarcity of some of the *Pupidae* and other moisture-loving species may be accounted for by the fact that the season was very dry. The shells of *P. albolabris* were somewhat darker than those found inland and are rather fragile, they range from 24 to 28 mm. greater diameter, altitude $14\frac{1}{4}$ to 19 mm.

Polygyra sayii is also dark-colored and very thin; they range from $19\frac{1}{2}$ to 22 mm., greater diameter, altitude 11 to 14 mm.

I am indebted to Dr. Pilsbry for identification of some of the minute species.

106. *Polygyra sayii* (Binn.), 7.

109. *Polygyra albolabris* (Say), 17.
 141. *Polygyra monodon* (Rack.), 10.
 181. *Strobilops virgo* (Pils.), 124 (17 albino, the others reddish).
 199. *Bifidaria pentodon* (Say), 9.
 225. *Vertigo gouldii* (Binn.), 16.
 260. *Vitrea hammonis* (Strom), 9.
 264. *Vitrea binneyana* (Mse.), 13.
 268. *Vitrea ferrea* (Mse.), 20.
 278. *Conulus fulvus* (Müll.), 10.
 278b. *Conulus chersinus polygyratus* (Pils.), 38.
 283. *Zonitoides arboreus* (Say), 64.
 293. *Zonitoides exiguus* (Stimp.), 30.
 294. *Zonitoides milium* (Mse.), 6.
 315. *Agriolimax agrestis* (L.), 2.
 333. *Philomycus carolinensis* (Bosc.), 2.
 334. *Philomycus dorsalis* (Binn.), 7.
 344. *Pyramidula striatella* (Anth.), 40.
 346. *Helicodiscus lineatus* (Say), 37.
 348. *Punctum pygmaeum* (Drap.), 4.
 362. *Succinea obliqua* (Say), 7.
 367. *Succinea avara* (Say), 1.
Carychium exiguum (Say), 17.

The following species occurred in the mud in places that would be swamps under favorable conditions.

Pisidium abditum Hald., 30.

Limnæa caperata Say, 11.

While out driving one day, I stopped on Mt. Agamenticus, Me., for about twenty minutes, and got the following on the eastern side near the base :

Strobilops virgo Pils., 4.

Pupa pentodon Say, 1.

Vertigo bollesiana Mse., 1.

Conulus fulvus Müll., 2.

Zonitoides arboreus Say, 1.

Philomycus carolinensis (Bosc.), 1.

Pittsburgh, Pa., Sept. 9, 1900.

A NEW SPECIES OF CERION.

BY W. H. DALL.

Mr. J. A. Stevenson, of Palm Beach, Florida, recently collected a number of land shells in the Bahamas, adding several species already known from other localities but not from Nassau, to the Bahaman fauna. Among those obtained from Long or Berry Island, was a form of *Cerion* which appears to be undescribed and is related to the group of *C. scalarinum* Pfr., called *Umbonis* by Maynard.

Cerion Stevensoni n. sp.

Shell very variable in general form, but in general roughly cylindrical, with the nuclear whorls as it were jammed down into the blunt summit of the cylinder, with the base carinate at the periphery, where the ribs cease, and below that constricted; whorls 8-10, nuclear ones nearly smooth, gradually developing fine transverse ribbing with subequal interspaces; these become stronger, with a strong revolving thread behind the suture; at the third whorl then the diameter of the shell suddenly increases the sides develop strong transverse rather irregular ribbing with wider interspaces, the ribs extending from the suture to the basal keel, beyond which they rarely extend; the base beyond the keel is constricted, rudely transversely wrinkled, inside the verge of the umbilicus centrifugally impressed and axially deeply perforate; aperture very variable in shape, with a broad, flattish, rather thin reflected margin; there is a parietal short lamina centrally situated and strong, but no trace of an axial fold; color light brownish or ashy to white, the whole surface sharply spirally striated, the striae sometimes crowded, sometimes distant. Alt. of two specimens, A, 27; B, 21; diam. A, 12; B, 14.5 mm.

Types, U. S. Nat. Museum; specimens in Stearns' collection, Detroit, Mich., and Mr. Stevenson's collection.

The entire absence of the axial fold is notable.

VALLONIA PULCHELLA MÜLL., IN LOS ANGELES AND ELSEWHERE IN CALIFORNIA, ETC.

BY ROBERT E. C. STEARNS.

For several months past, I have been making a careful search for *slugs*, in the interest of Dr. Pilsbry, with poor results, as these ani-

mals, for some reason, are of rare occurrence on my grounds; neither my own nor those of my immediate neighbors containing any. About the middle of last August, I made my regular examination of certain bricks, bats and pieces of wood, that have been turned over for the hundredth time, with the usual experience in the way of *slugs*, but had my reward by finding, to my great surprise, a large number, over a hundred, of *Vallonia pulchella*. This species has not before been reported as occurring in Los Angeles or elsewhere in this region. Many species and some varieties of the general *Vallonia* form have been made by Dr. Sterki and others, based on the American aspects of this genus. Dr. Pilsbry, referring to the examples sent to him from my premises, says it is our "old friend pure and simple," and further remarks that "Curiously we did not find it in the Great Smokies, but Ashmun gets some costate forms (not *pulchella*) in Arizona and New Mexico." Raymond obtained one specimen of the var. *costata* in Bloody Canyon, east side of Mono Pass, at an altitude of about 8000 feet, in 1889. Mr. R. C. McGregor,¹ collected *V. pulchella* "in a yard at base of rose bushes," at Redding, in Shasta county.

In Dr. Cooper's catalogue of West North American shells, he gives the distribution as "circumboreal," south to Mono county, Cal., and subsequently, "Donner Lake, and near Truckee," in the California Sierras. Mr. Button informs me that he found it plentiful some years ago in Mountain View Cemetery, near Oakland; that specimens from that locality "are light-colored, living on white marble copings." Mr. Hemphill states that he has "found *V. pulchella* at Julian City, San Diego Co., and at several other places in California, Oregon and Washington." The late A. W. Crawford, according to Mr. Raymond, collected it at "San Jose," in Santa Clara county.

It will be seen by the above that this pretty little snail is quite widely dispersed in California, as well as elsewhere in the Pacific States. In Pilsbry and Johnson's list² of American Land Shells, etc., it is credited to "Montana eastward, from Canada to, or nearly to, the Gulf of Mexico. Europe."

¹ See NAUTILUS, XII, Sept., 1898, p. 60, and Mrs. Williamson in same for Oct., 1898, pp. 71-2.

² Philadelphia, April, 1889, p. 7.

The æsthetic taste exhibited by *Vallonia pulchella* is noteworthy; from under the *Roses* of Shasta county in the north, to the *Verbena* beds of Los Angeles in the south, and among the *marbles* of Mountain View, in Alameda county, suggests a refinement of discrimination in this "mere atom of humble life," that would furnish a good text for a sermon.

Mr. Button, in his note to me referring to the cemetery habitat, writes, "Query—Brought from the East in plants?" As to the occurrence of *V. pulchella* in my grounds, I am wholly at sea, for no plant forms, from the neighborhood or elsewhere, have been introduced by me for a long time, and these little snails have appeared in numbers, *within six weeks*.

In considering the hypsometric distribution, the altitude of Donner Lake is, according to Gannett,¹ from whom these various elevations are quoted, 6095 feet; Truckee 5820 and Redding 555 feet; Julian 4500 and Los Angeles about 300 feet, while the Mountain View Cemetery grounds are probably slightly less than the Los Angeles figure.

Los Angeles, California, Sept. 12, 1900.

AN HOUR ON THE GREAT RAFT.

BY LORRAINE S. FRIERSON.

While the readers of NAUTILUS are waiting to hear of the results of the exploration of the Great Smokies by Ferriss, Walker & Co., perhaps they would like to hear about a trip to the Great Raft of the Red River.

This raft of logs was at one time 150 miles long, but it has long since been removed from the main river. There still remains in an arm of the river about five miles of the old raft. This raft is not continuous, but consists of separate pieces from a mile long down to fifty yards. These logs are in some places only one log deep, *i. e.*, the surface of the water is covered by a single layer of logs.

In other places, however, the river is completely filled with a solid mass of logs from ten to fifteen feet deep. These logs are covered

¹ Dict. of Altitudes in the U. S., 3d Ed., U. S. Geol. Survey, 1899.

with a mass of vegetation consisting of smart-weed, various species of sedges, grasses and bushes. Near the water, on a zone of about two inches wide, which is permanently wet, may be found two minute snails: *Vertigo rugosula* Sterki and *V. ovata* Say. On the tops of old and large logs there is frequently a deposit of earth, which supports a colony of land shells. Among these may be found *Polygyra thyroides* and its variety *bucculenta*, *Polygyra monodon* var. *friersoni* Pilsbry. Rarely may be obtained *Polygyra carolinensis* Lea.

Roaming about on the logs may be found colonies of *Succinea* of a black color. That is to say, the animal itself is black, covered with small golden-colored spots, making a handsome animal. These *Succineas* would be found here in untold numbers, probably, were it not for two enemies who derive a considerable part of their living from them. One of these enemies is the whole Heron family, and the other is the frog family. Between the heron and frogs the *Succineas* have a poor chance.

As before remarked, bunches of various sedges grow on these logs. These sedges grow in bunches about two feet high and about one foot in diameter. Hidden in these bunches, down near the roots, may be found another species of *Succinea*. These are of a straw-yellow color. Between these and the blacks are several points of difference. The blacks live on the logs, the yellow ones live on the tussocks of sedges. Here is a nut for the evolutionist. Is the straw-colored snail colored like straw because it lives on straw? or does it live on straw because it is straw-colored? Another point is that the straw-colored snail (who is nearly always hidden in the bunches of grass) is sweet tasted, or at any rate is not nauseous; while the blacks who roam about considerably have quite a pronounced bitter taste. Both of these snails have been called *S. salleana*, but being sure that there were two species, they were submitted to Dr. H. A. Pilsbry, with the result that the blacks are *Succinea luteola* Gld., while the yellow fellows are *Succinea salleana* Pfr.

Out in the water, among the floating roots of the duck weeds, etc., may be found *Planorbis trivolvis* Say, and a minute *Limnæa*. This *Limnæa* is the only representative of its tribe thus far seen in Northern La. No specimen over one fourth of an inch long has ever been secured. It is labelled *L. caperata* Say, but with a good deal of doubt.

More about this raft and its inhabitants could be written, but *hot!*

Gracious, how the perspiration rolls off a fellow ! Down between the banks, with an August sun overhead, and the steam arising from the rank vegetation, and the sun's rays reflected from the water, we thought of Ferriss digging snails on the mountain tops, and we quit, but we had at least 100 *Succineas*.

SHELL COLLECTING NEAR ROCHESTER, N. Y.

BY FRANK C. BAKER.

For the past five years the writer has made annual pilgrimages to Rochester, New York, partly to spend his summer vacation, and partly to get better acquainted with the mollusks which flourish about the "Flower City." The vicinity of Rochester is peculiarly adapted for molluscan life, owing to the fact that the Niagara limestone out-crops in various places, affording an abundance of lime for the secretion of their shells, which are, therefore, large and fine.

The Eskers known as the Pinnacle and Cobb's Hill, are my favorite localities, and many fine species have been collected. The former locality is a rounded, dome-shaped hill some 200 feet in height, the slope being from 10 to 30 degrees, well wooded on its summit, with a little ravine between the main hill and a small knoll, and littered by fallen, rotting logs and dead leaves. Helices are here very abundant, such forms as *Vitrea arborea*, *V. indentata*, *Omphalina fuliginosa*, *Gastrodonta intertexta*, *Pyramidula alternata*, *P. striatella*, *Polygyra albolabris*, *P. sayii* (rare), *P. monodon*, *P. tridentata* (many varieties), and *Cochlicopa lubrica* being readily collected. Cobb's Hill, just across Monroe avenue, yields about the same fauna.

At a point in the Erie Canal where the waters widen to form a pond, hence called "wide-waters," the fresh water mollusks are numerous, and such species as *Limnæa stagnalis* (large and fine), *L. palustris*, *L. catascopium*, *L. desidiosa*, *Planorbis trivolvis*, *Physa heterostropha*, *Pleurocera subulare*, *Goniobasis livescens*, *Bythinia tentaculata*, *Valvata sincera*, and *V. tricarinata* are common. Between Rochester and Pittsford, in the canal, a colony of *Vivipara contectoides* has established itself, and a large number of fine specimens may be gathered at any time. When the water is drained from the

canal in the spring, it is a fine place for unios, such species as *Anodonta salmonia*, *A. benedictii*, *Alasmodonta marginata*, *A. deltoidea*, *Unio gibbosus*, *Anodontopsis ferussacianus*, *Quadrula plicata*, *Q. undulata*, *Lampsilis gracilis*, *iris*, *nasutus*, *luteolus*, *ventricosus*, *rectus*, *alatus*, and *cariosus* being found in great abundance and beauty; the bottom is covered knee-deep with black mud, affording a fine retreat for the mussels.

The Genessee River, both above and below the falls, affords good collecting, the unios being abundant above and the gastropods below the falls. The characteristic species above the falls are *Alasmodonta marginata*, *A. rugosa*, *A. pressa*, *Quadrula rubiginosa*, *Lampsilis iris*, *L. luteolus*, *L. alatus*, *Sphærium simile*, *S. stamineum*, *S. transversum*, *Limnæa palustris*, *Planorbis trivolvis*, *Physa heterostropha*, *Goniobasis livescens* and *Campeloma decisum*, while those below are *Sphærium transversum*, *Limnæa catascopium*, *Planorbis trivolvis*, *Physa heterostropha*, and *Bythinia tentaculata*.

Both the east and west banks of the Genessee River below the falls are good localities for mollusks, about the same species being found as on the Pinnacle, with the addition of *Pupa muscorum*, *Circinaria concava*, *Vallonia pulchella*, *V. costata*, *Polygyra thyroides*, *P. hirsuta* and *P. palliata*. The wooded banks of Seneca Park afford good retreats for mollusks, and they may be found here in great abundance.

One of the pleasantest trips near Rochester is to Irondequoit Bay, an inlet from Lake Ontario, five miles long and about one in breadth. The hills about are from 100 to 200 feet high, and the water has a maximum depth of 80 feet. Mollusks are correspondingly numerous: *Sphærium simile*, *S. transversum*, *Succinea ovalis*, *Limnæa palustris*, *L. desidiosa*, *Planorbis campanulatus*, *P. trivolvis*, *P. bicarinatus*, *P. deflectus*, *P. parrus*, *Segmentina armigera*, *Ancylus tardus*, *Physa heterostropha*, *Pleurocera subulare*, *Goniobasis semicarinata*, *Bythinia tentaculata*, *Amnicola lustrica*, *Valvata sincera* and *V. tricarinata* are found in great abundance along the shore or living on the lily pads. The wooded banks yield the common helices in great abundance.

The best fresh-water beach collecting which the writer has ever experienced is to be found at Charlotte and Summerville, on Lake Ontario, the former on the west and the latter on the east side of the mouth of the Genessee River. There is always a line of "seawrack" which is alive with fresh-water mollusks. Here we have

always collected *Lampsilis luteolus*, *Sphærium simile*, *S. stamineum*, *S. fabale*, *Pisidium abditum*, *P. bakeri* (= *P. amnicum* Müll., teste Sterki), *Limnæa palustris*, *L. desidiosa*, *Planorbis campanulatus*, *P. trivoleis*, *P. bicarinatus*, *P. deflectus*, *P. parvus*, *Ancylus parallelus*, *Physa heterostropha*, *Pleurocera subulare*, *Bythinia tentaculata*, *Amnicola limosa*, *A. lustrica*, *A. obtusa*, *A. cincinnatiensis*, *Gillia altilis*, *Somatogyrus subglobosus*, *Valvata sincera*, *V. tricarinata* and *V. obtusa*. *Pisidium bakeri* Pilsbry has been found in great abundance at Summerville, where specimens nearly a quarter of an inch in length have been collected. *Valvata obtusa* Drap. was found at both Charlotte and Summerville in 1899 fully as abundant as *V. sincera*! This species was reported from this country for the first time in 1897, when but a few specimens were obtained. In the interval between that time and August, 1899, it had increased a hundred fold. It is probable that many introduced species will be found in our Great Lakes if the shore debris be carefully searched.

The localities mentioned above have yielded altogether 150 species, many of which may be found here in as great abundance and perfection as at any locality in the northern part of the United States.

NOTES AND NEWS.

A NEW AMERICAN SLUG.—Dr. J. F. Babor has described an interesting new form, *Ariolimax steindachneri*, from a specimen collected by F. Steindachner on Puget Sound, in 1874.¹ It is large, length 80 mm., breadth 19, height 21 mm., about the size of *Ariolimax columbianus*, and differs externally from that species in having the well developed tail pore an open slit, as in *Hesperarion*, not plugged as in the other *Ariolimaces*. The teeth are as in *A. californicus*. The genitalia lie free, the ovotestis anterior, at the stomach. The penis contains a large papilla but is otherwise hollow, much as in *Hesperarion*. There is no appendiculum, and no "retensor" muscle, but a vaginal retractor is developed.

The species is clearly intermediate to some extent between *Hesperarion* and *Ariolimax*, and may indicate that the former group

¹ *Annalen des K. K. Naturhist. Hofmuseums*, xv, 1900, p. 95.

should be reduced to the rank of a subgenus. Zoölogists who have opportunity to collect in the Puget Sound region should be on the lookout for this slug, for it is important that its anatomical characters be confirmed by additional specimens, as only one was examined by Dr. Bator. It can probably be recognized externally by the different tail pore. It has not been figured.

NOTE ON *ASHMUNELLA HYPORHYSSA* (Ckll.).—I have recently visited Cloudercroft, in the Sacramento Mts., N. M., and found *hyporhyssa* excessively abundant, under pine logs and pieces of pine bark upon the ground. The Cloudercroft form differs from the type of *hyporhyssa* (*rhysa* var.) in uniformly lacking the parietal tooth, but otherwise the shell seems quite the same. It may be called var. *edentata*. There are three color-mutations, as follows:

(1) *Edentata* proper; shell horn-color or pale greyish-brown. The commonest form.

(2) *Rufescens*, n. mut.; shell deep ferruginous or chestnut color, lip tinged with pink. Quite common. Analogous to the mut. *rubens* of *Hygromia rufescens*.

(3) *Alba*, n. mut.; shell creamy white. Rare, only three or four found. The first albino reported in *Ashmunella*.—T. D. A. COCKRELL.

CIRCINARIA HEMPHILLI IN CALIFORNIA.—I have specimens of *Circinaria hemphilli* from Central California, as follows:

1. Mission Peak, near eastern shore of San Francisco Bay.

2. Forest Hill, Placer Co., in Sierra Nevada Mts., west slope, 3,700 ft. alt. I think this species has not heretofore been reported from further south than Oregon.—FRED L. BUTTON.

HELIX HORTENSIS IN NEWFOUNDLAND.—A friend has just brought me a living example of *H. hortensis* (12345) from the "headwaters of Robinson's River," west coast of Newfoundland, and promises a lot of them next year. Isn't this a new locality?—G. H. CLAPP.

THE NAUTILUS.

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No. 7.

LAND SNAILS OF CAPE MAY, NEW JERSEY.

BY HENRY A. PILSBRY.

The littoral of Southern New Jersey is perhaps as unpromising collecting ground for the land shell hunter as can be found in the Eastern States. The general physical features of the region are well known, now that the whole coast has become a great summer playground; but it may be said that the land snails are nearly or entirely confined to the occasional patches and strips of cedar scrub on the islands and along the shore, usually within a couple of hundred yards of the beach, and often separated from it by a narrow strip of shifting sand dunes. Between these littoral cedar groves and the mainland proper, wide stretches of salt marsh intervene, intersected by inlets, and inhabited by myriads of *Melampus lineatus*, *Litorina irrorata* and *Modiola plicatula*.

Such situations occur at frequent intervals from Atlantic City to Cape May. At the latter place the salt marshes are reduced to a minimum; but in common with the more northern localities, the shore strip is insulated, so far as the land snail fauna is concerned, by the pine belt of the interior. There are, however, many deciduous trees and a rich soil at Cape May, while at the more northern localities the deciduous trees are wanting, except where imported, and the dark soil is a mere film over nearly pure sand.

The snails are everywhere, so far as my own experience goes, confined to the cedar groves. At Cape May Point there is a dense growth of cedar, oak, dwarf plum, bay, with more or less holly and prickly pears. It need not be mentioned to a New Jersey naturalist

that in these choice retreats mosquitoes are abundant. The New Jersey mosquito, like Napoleon's famous Old Guard, dies, but never surrenders. You wipe him off, and the gore flows freely. Here were found *Polygyra albolabris maritima*, *Bifidaria hordeacella*, *B. pentodon*, *Vertigo milium*, *Zonitoides arboreus*, *Agriolimax campestris* and *Succinea campestris vagans*. Only one specimen each of the *Zonitoides* and *Agriolimax* were found. An additional species, *Zonitoides minusculus*, occurred a few miles further northwest.

In Cape May city, on mounds around the tanks at the gas works at 703 Lafayette street, I found *Vallonia pulchella* and *Pupoides marginatus* quite abundant. These may possibly be imported species, as nothing of them was seen except in the old and long settled part of town.

The most remarkable records are *Bifidaria hordeacella*, a species of the Gulf States, hitherto not known north of the Georgia Sea Islands, and the very distinct variety of *Succinea*, which may be defined thus :

***Succinea campestris vagans*, n. v.**

Shell similar to *S. campestris* in the wrinkled surface and very convex last whorl, but smaller, with only $2\frac{2}{3}$ whorls in fully mature specimens, the aperture shorter and less ovate, and the color a rather pale olive-green, translucent, with scarcely any whitish layer within ; surface rather dull.

Length 9, diam. 6.5, longest axis of aperture 6.2 mm.

Length 7.6, diam. 5.6, longest axis of aperture 5.4 mm.

Cape May Point, N. J. (H. A. P., August, 1898.) Types No. 78,882, coll. A. N. S.

I cannot refer the specimens to any Northern species. They are nearer *S. campestris*, which extends from the Georgia coast, throughout Florida, and west to the mouth of the Mississippi, the western specimens being the thin, smooth and glossy variety *unicolor* of Tryon.

Some years ago, Mr. W. B. Marshall reported *Succinea avara* from Cape May. "The exact locality was on the ocean front at 8th avenue, Mt. Vernon, between Cape May City and Cape May Point, and was not more than 200 feet from the line of high tide."¹ Some of these specimens are now before me, and seem referable to *S. aurea* Lea rather than to *avara*; though it must be acknowledged that the

¹ NAUTILUS, VI, p. 19, June, 1892.

determination of *Succineas* is often far from certain. Similar shells were sent by Mr. C. Le Roy Wheeler, also from Cape May, exact locality not given.

My collection was made in August, 1898.

MOLLUSCA OF SOUTHERN KENTUCKY.¹

BY SADIE F. PRICE.

While engaged in botanical work, I have collected the following land and fresh-water shells, most of them in Warren county :

Polygyra plicata Say.

Polygyra divesta Gld. Scarce. Probably the first time this species has been listed so far east or north. Bowling Green.

Polygyra troostiana Lea.

Polygyra monodon Rack.

Polygyra palliata Say. Warren, Barren and Edmonson counties, and East Kentucky at Burnside.

Polygyra appressa Say. Common, Warren and Edmonson counties.

Polygyra inflecta Say. Common, Warren, Barren and Edmonson counties.

Polygyra rugeli Shuttl. Bowling Green.

Polygyra tridentata Say. Common, Warren, Edmonson and Barren counties.

Polygyra obstricta Say. Not common. Under rotten logs. Warren and Barren counties.

Polygyra albolabris Say. Warren, Barren and Edmonson counties.

Polygyra elevata Say. Common throughout South Kentucky.

Polygyra exoleta Binn. Very common.

Polygyra clausa Say.

Polygyra thyroides Say. Very abundant.

Polygyra thyroides bucculentus Gld. Bowling Green.

Polygyra downieana Bld. Rare. Warren and Edmonson counties.

Polygyra profunda Say. Scarce. Edmonson county.

Polygyra stenotrema Fér.

¹ I am indebted to Mr. C. T. Simpson, National Museum, for naming doubtful Unios.

Vallonia pulchella Mull. Rather common. Bowling Green.

Pyramidula perepectiva Say. Rather common throughout Southern Kentucky. Also found at Torrent, East Kentucky Mountain.

Pyramidula bryanti Harper. Only one specimen found. This Mr. Simpson says is considerably out of its usual range.

Pyramidula alternata Say. Barren, Edmonson and Warren counties, East Kentucky in the mountains.

Pyramidula alternata carinata Pils. Rather common. Bowling Green.

Pyramidula alternata mordax Binney. Not common. Bowling Green.

Strobila labyrinthica Say. Bowling Green.

Pupoides marginatus Say.

Bifidaria contracta Say.

Bifidaria armifera Say.

Bifidaria procera Gould.

Circinaria concava Say. Bowling Green, Brownsville.

Vitrea indentata Say. Warren county.

Zonitoides arboreus Say. Warren county.

Vitrea sculptilis Bld.

Omphalina lævigata Pfr. Warren and Edmonson counties.

Gastrodonta ligera Say. Throughout southern Kentucky.

Gastrodonta acerra Lewis. Barren county.

Gastrodonta demissa Binn. Common.

Gastrodonta interna Say. Southern Kentucky and in the mountains of East Kentucky.

Bulinulus dealbatus Say. Common on rocky hillsides. Bowling Green.

Succinea urara Say.

Succinea oralis Gld.

Succinea totteniana Lea (?). On ferns in sink-hole. Bowling Green.

Heliodiscus lineatus Say. Bowling Green.

Helicina orbiculata Say.

Limnæa humilis Say. Near Green and Barren rivers, under damp moss.

Planorbis bicarinatus Say. Rather common.

Planorbis trivolvis Say. In ponds. Common.

Planorbis parvus Say. On rocks in ponds.

- Ancylus rivularis* Say. In ponds and rivers.
- Physa gyrina* Say. In springs and creeks throughout southern Kentucky and at Lexington.
- Physa pomilia* Con. In ponds. Not uncommon.
- Physa heterostropha* Say. Barren River.
- Physa heterostropha*, var. Creeks.
- Campeloma obesum* Lewis (?). Barren River.
- Campeloma integrum* Say. Barren River.
- Campeloma ponderosum* Say. Common.
- Lioplax subcarinata* Say.
- Pomatiopsis lapidaria* Say. Bank of Barren River.
- Pleurocera filum* Lea. Very common.
- Pleurocera sycamoreuse* Lea.
- Pleurocera undulatum* Say.
- Lithasia planispira* Anthony.
- Lithasia nuclea* Lea.
- Lithasia undosa* Anth.
- Lithasia obovata* Say.
- Goniobasis curvilabris* Anth.
- Goniobasis curvilabris*, var. Rather common.
- Goniobasis abbreviata* Lea.
- Goniobasis curreyana* Lea. Common.
- Goniobasis costifera* Hald. Green and Barren Rivers.
- Goniobasis costifera*, var.
- Goniobasis vicina* Anth. Warren county.
- Goniobasis athleta* Anth. Barren county.
- Goniobasis depygis* Say.
- Goniobasis nassula* Con. var. Indian Creek.
- Goniobasis infantulum* Lea.
- Goniobasis saffordii* Lea. Indian Creek.
- Goniobasis edgariana* Lea. Creeks.
- Goniobasis elegantula* Anth. Barren River.
- Goniobasis paupercula* Lea.

UNIONIDÆ.

- Quadrula undulata* Barnes. Common in all streams.
- Quadrula trigona* Lea. Common.
- Quadrula rubiginosa* Lea.
- Quadrula pyramidata* Lea.

Quadrula coccinea Con.

Quadrula pustulosa Lea. Very common.

Quadrula obliqua Lam.

Quadrula verrucosa Barnes.

Quadrula globata Lea.

Quadrula lachrymosa Lea.

Quadrula plicata Say.

Quadrula cooperiana Lea.

Quadrula heros Say. Barren county.

Quadrula metanerva Raf.

Quadrula cylindrica Say,

Quadrula solida Lea.

Plagiola elegans Lea.

Plagiola securis Lea.

Plagiola donaciformis Lea.

Lampsilis ventricosus Bar. Barren River.

Lampsilis multiradiatus Lea.

Lampsilis ligamentinus Lam. Very common.

Lampsilis ligamentinus Lam. var.

Lampsilis gracilis Barnes.

Lampsilis anodontoides Lea. Ohio, Green and Barren Rivers.

Lampsilis rectus Lam.

Lampsilis cumberlandicus Lea.

Lampsilis luteolus Lam. *L. lienosus* Con.

Lampsilis texasensis Lea.

Lampsilis ovatus Say. *L. obscurus* Lea.

Lampsilis regularis Lea.

Lampsilis alatus Lea. Common.

Lampsilis iris Lea. *Lampsilis perdix* Lea.

Lampsilis subrostratus Say.

Lampsilis planicostatus Lea.

Lampsilis parvus Barnes.

Lampsilis caliginosus Con.

Lampsilis vanuxemensis Lea.

Lampsilis nigerrimus Lea.

Lampsilis fatuus Lea.

Unio grandiferus Lea. Rather common.

Unio gibbosus Barnes. Both the purple and salmon-colored forms are found in all streams.

- Obliquaria reflexa* Raf. Common.
Obliquaria lens Lea.
Ptychobranhus phaseolus Hild.
Strophitus edentulus Say.
Truncilla perplexa Lea.
Truncilla perplexa rangiana Lea.
Truncilla triquetra Raf.
Pleurobema clara Lam.
Pleurobema asopus Green.
Pleurobema edgariana Lea.
Obovaria circulus Lea.
Tritigonia verrucosa Raf. *U. tuberculatus* Barnes.
Cyprogenia irrorata Lea. Common.
Micromya lapillus Lea.
Alasmodonta rugosa Barnes. Common.
Alasmodonta deltoidea Lea.
Alasmodonta minor Lea. Gasper River.
Alasmodonta truncata (Say) Wright.
Anadontoides ferussacianus Lea.
Anodonta imbecilis Say. Rivers and ponds near rivers.
Anodonta grandis Lea.
Anodonta grandis gigantea Lea.
Sphærium sulcatum Lam.
Sphærium fabale Prime. River and creeks.
Calyculina partumeia Say.
Calyculina transversa Say.
Pisidium virginicum Gm. Rivers and ponds.
Pisidium peraltum Sterki. Ponds.

NEW SPECIES OF JAPANESE LAND MOLLUSCA.

BY H. A. PILSBRY.

Eulota (Plectotropis) kiusiuensis n. sp.

Shell openly umbilicate, depressed, acutely carinate, light yellowish brown, slightly shining. Surface densely but lightly striate spirally, under a thin cuticle which bears rather wide-spaced, irregularly developed lamellæ ending in short shreds at the periphery, the

lamellæ frequently interrupted on the base. Spire very low-conic; whorls barely 6, slightly convex, slowly increasing, the last a little pinched above and below the peripheral keel. Base much more convex than the spire, flattened and sloping below the keel, swollen towards the middle, obtusely angular around the conic umbilicus. Aperture oblique, irregularly squarish, the peristome white, somewhat thickened within, angular at the terminations of the peripheral and umbilical carinæ, the upper margin hardly expanded, basal margin expanded, somewhat reflexed, columellar margin a little dilated.

Alt. 8.5, diam. 17.5 mm.

Alt. 8.5, diam. 17 mm.

Kikai, Osumi, in southern Kiusiu (Mr. Y. Hirase).

This species is closely related to *E. trochula* (A. Ad.), known only from Tsusima, differing from that species in the much more angular aperture, far flatter spire and more convex base.

Trishoplita goodwini var. *suprazonata* n. var.

Shell similar in form to *T. goodwini*, but with apex obtuse; thin, somewhat translucent, corneous-brown, paler around the umbilicus, and with a wide white zone bordering the suture, ascending the spire. Whorls $5\frac{1}{2}$. Alt. 9.5, diam. 13.5 mm.

Ushirokawa, Tosa, Shikoku Island (Mr. Y. Hirase).

A smaller form, alt. 8.5, diam. 11.5 mm., occurs at Kagoshima, Satsuma, in southern Kiusiu. This variety is more conic than the variety *fusca* of Gude, which is moreover smaller and without the whitish band above.

Kaliella symmetrica n. sp.

Shell minutely perforate, turreted-pyramidal, the spire with convex lateral outlines and blunt, rounded apex; yellowish-corneous; sharply striated above with excessively fine, densely crowded longitudinal striæ, which give it the luster of silk, the base glossy, showing faint, spaced spiral lines under a high magnification. Whorls $5\frac{1}{2}$, very convex, the last obsoletely subangular at the periphery, moderately convex beneath, impressed around the perforation. Aperture basal, rather narrow, curved, shaped like the middle third of a crescent with the ends cut off; outer and basal margins of the peristome acute and simple, the columella vertical, its edge triangularly reflexed. Alt. 2.1, diam. 2 mm.

Kashima, Harima (Mr. Y. Hirase).

This species somewhat resembles *Hyalina prastulina* Reinhardt, but it is proportionately higher, smaller, the last whorl less enlarged, the spire being more prominent; consequently the aperture is smaller. I would consider this shell an *Euconulus* were it not so closely allied to the following species, which I do not doubt is a *Kaliella*. Half-grown specimens are still only obtusely angular at the periphery.

Kaliella fraterna n. sp.

Shell similar to *K. symmetrica*, except that it has an acute, projecting, thread-like peripheral keel, like that of *K. labilis* (Gld.), extending undiminished to the aperture.

Kashima, Harima, with *K. symmetrica* (Mr. Y. Hirase).

Euconulus Reinhardtii n. sp.

Shell globose-conic, perforate, fragile, pale corneous yellow; glossy, with sparse rather conspicuous oblique growth-wrinkles and extremely fine subobsolete, crowded spiral striae. Spire elevated, the apex rather acute. Whorls $5\frac{1}{2}$, quite convex, separated by deeply impressed sutures, the last whorl large, subglobose, rounded at the periphery, but showing the almost obsolete trace of a peripheral angle; base strongly convex, slightly impressed around the narrowly perforate axis. Aperture somewhat oblique, roundly lunate, the peristome thin, very fragile, simple, the columellar margin rather broadly dilated above. Alt. 3.9, diam. 3.7 mm.

Kashima, Harima (Mr. Y. Hirase).

A globose-conic species which I first thought to identify with *H. pupula* Gould; but it differs from that insufficiently defined species in the rounded last whorl and various other characters.

It has been shown that the name *Conulus* is preoccupied in Mollusca by Rafinesque, who proposed that name for the genus *Conus*. This will prevent its use for the common *Helix fulva* of Müller, and various European authors have now abandoned *Conulus* in favor of *Arnouldia* of Bourguignat. It has apparently escaped the notice of these gentlemen that *Euconulus* of Reinhardt was proposed for the *fulvus* group some seven years before Bourguignat's publication. The genus will therefore stand thus:

EUCONULUS Reinh.

Conulus Fitz., 1833, not of Rafinesque, 1814.

Euconulus Reinhardt, Sitzungs-berichte Ges. naturforsch. Freunde zu Berlin, 1883, p. 86 (*E. fulvus* and *praticola*).

Arnouldia Bgt., Bull. Soc. Mal. France, VII, 1890, p. 328.

It is doubtful whether any Japanese species really belong to *Euconulus*. Most of them have all the shell characters of *Kaliella*, a genus abundantly developed in India, China and indeed the whole Orient. Reinhardt's Japanese "*Trochoconulus*" I refer to *Kaliella*. His "*Discoconulus*," judging from *sinapidium*, the only species I have seen, might belong to *Vitrea*. *Arnouldia nahaënsis* of Gude is a *Kaliella*.

Punctum japonicum n. sp.

Shell minute, openly and rather widely umbilicate, depressed, thin, light brown. Spire convex, low; whorls $3\frac{1}{2}$, quite convex, separated by deeply impressed sutures, regularly and rather slowly increasing; last whorl tubular, rounded at the periphery. Sculpture of delicate spaced, irregular lamellar riblets, the intervals sharply finely striated, and with close spiral striae. Width of the umbilicus is contained about $3\frac{1}{3}$ times in the diameter of the shell, all the whorls readily visible within it. Aperture rounded-lunate, oblique, the peristome simple and acute.

Alt. 0.7, diam. 1.25, width of umbilicus 0.37 mm.

Kashima, Harima (Mr. Y. Hirase).

The only other known Japanese species of *Punctum* is "*Helix* (*Patula*) *lepta*" of Westerlund, described from Nagasaki. It has a much narrower umbilicus than *P. japonicum*, the last whorl is sub-angular above, and it is described as with dense riblets.

NEW RECORDS OF NEW MEXICAN SNAILS.

BY H. A. PILSBRY.

August 25th last, Professor T. D. A. Cockerell collected a few snails "in Chicorico Cañon, near Raton, New Mexico. This is in the region of *Quercus gambeli* and *Robinia neomexicana*, at an elevation of about 7000 ft. There are no previous records of mollusca from this region. It is quite in the northern part of the State, only a few miles from the Colorado boundary." The species are:

Vallonia gracilicosta Reinh.

Vitrina pfeifferi Newc.

Euconulus fulvus (Müll.).

Zonitoides arboreus (Say).

Bifidaria pilsbryana Sterki. A form with the crest more developed than in the type, and the palatal folds standing upon a callous ridge.

In this connection I may mention that a specimen of *Bifidaria holzingeri* (Sterki) has been found among minutiae collected by Prof. Cockerell at Mesilla, N. M., in drift of the Rio Grande. So far as I know, this species has not been reported before from west or southwest of Wichita, Kansas.

Ashmunella chiricahuana (Dall) has been collected by Prof. E. O. Wootton in a pine region on the west fork of Gila River, near Mogollon Peak, N. M.

DESCRIPTION OF NEW SPECIES OF ASIATIC SHELLS.

BY C. F. ANCEY.

Euhadra (?) *pseudocampylæa* Anc.

Testa convexo-depressiuscula, omnino tecte perforata, nitidiuscula, parim solidula, sub epidermide tenui fusco lutea sordide albescens vel pallide brunnea, lineolis incrementi subtus magis conspicuis obsolete notata. Spira convexa, parum elevata, obtusissima. Anfractus $5\frac{1}{2}$ convexi, sutura impressa separati, sat lente et regulariter crescentes, ultimus supra prope aperturam leviter malleatus, antice leniter descendens, dein ad peristoma paululum ascendens, supra convexus, ad peripheriam rotundatus, basi convexo-depressus, in umbilici loco profunde impressus pone aperturam breviter constrictus. Apertura transverse suboblonga, lanata, obliqua, marginibus distantibus, callo tenui junctis, extero regulariter arcuato, basali subdeclivi. Peristoma album, incrassatum, breviter expansum, ad basin et columellam præcipue reflexum, angustum, supra perforationem prorsus clausam dilatatum.

Diam. max. 30, min. $25\frac{1}{2}$, alt. 17 mill.

Hab.: Tâtsiën-loû, ad limites Thibeti et provinciæ sinensis Sse-tchuen (Comm. Cl. Abbé Mège).

This is a very distinct species, and at once recalls to mind a large and more globose *Helicigona pyrenaica* with a closed umbilicus. It is provisionally referred to *Euhadra*, but the generic position is difficult to ascertain. A single dead example was obtained, and is in my collection. With this I received a fine example of the very rare *Helicarion Böttgeri*, Hilber, of which the Austrian expedition of

Szechenyi obtained a single specimen. These shells were detected by French missionaries, and the locality, although furnishing several species of mollusca, is not a rich one as far as shells are concerned.

Planorbis persicus Anc.

Testa compressa, non carinata, olivaceo vel subgriseo-cornea, oblique confertim striata, nitidula, pro genere relative solidiuscula, utrinque lateumbilicata et concava, discoidea. Spira apice minute immerso. Anfractus 5, convexi, sutura impressa, sat lente crescentes; ultimus supra convexo-declivis, post medium rotundato-subangulatus, infra depressus. Aperture obliqua, transverse oblonga, sublunata, intus obscure albo-labiata (in peradultis), marginibus callo appresso junctis. Diam. mag. 9, min. $7\frac{1}{2}$, alt. $2\frac{2}{3}$ mill.

Hab.—Téhéran, prov. Trak-ajemi, Persia; Salmas, north of Lake Urmiah, Persia (Comm. G. Nægele).

This is allied to, but different from, *Pl. subangulatus* Phil., from which it is easily distinguished in being much less distinctly angled below the periphery. The above description is drawn from the largest specimen sent me by Herr G. Nægele; some also probably mature are much smaller and more rounded.

Physa Moussoni Ancey.

Physa lirata, Mousson in Journ Conch., 1874, p. 43, non Tristram (1863), nec Craven (1880).

The name *Physa lirata* having been used several times, I should call attention to the fact that Dr. Rudolf Sturany (Catalog der Sudafrik. Land- und Süßwasser-Moll., 1898, p. 76), not being aware that several years ago I proposed to substitute *Physa Craveni* for *lirata* Craven (not of Tristram), calls the latter *Craveni* Sturany, while I should claim for the priority of *Craveni*, Ancey; but this induces me also to change *lirata* Mousson to *Moussoni* Ancey, as the specific name *lirata* must be retained for the species originally described from Madagascar.

Ph. Moussoni Ancey was discovered in Mesopotamia by Dr. Schaeffli.

Helicina Sundana Ancey, nom. nov.

The above name I suggest for *Helicina exserta* Martens, a species occurring in the islands of Saleyer, Kalao and Jampea, between Celebes and Flores, as another *Helicina* from Cuba has long ago been described under the same name of *exserta*, "Gundlach, MSS.," by L. Pfeiffer (see Malak Blätter, v, 1858, p. 194).

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RECORDS OF MOLLUSCA FROM NEW MEXICO.

BY H. A. PILSBRY AND T. D. A. COCKERELL.

The Mollusca of the Sandia Mts., New Mexico.

Nothing has hitherto been reported concerning the mollusca of the Sandia Mountains, near Albuquerque, so it may be well to enumerate a small collection made there by Miss Maud Ellis, and submitted to us for determination. The precise locality is Las Huartus Cañon, alt. 8-9000 ft. The species are similar to those of the Colorado mountains, and the Sandias, so far as our present knowledge goes, marks the southern limit of this fauna as a whole, though certain of its members extend much further south.

Vitrina pfeifferi Newc.	Pyramidula cockerelli Pils.
Euconulus fulvus (Drap.).	P. cockerelli mut. viridula (Ckl.). ¹
Zonitoides arboreus (Say).	Vallonia cyclophorella Ancey.
Z. minusculus (Binney).	Pupa blandi Morse.
Thysanophora ingersolli (Bland).	Bifidaria pilsbryana Sterki.
Pyramidula strigosa (?) Young.	

Miss Ellis also collected *Helicodiscus lineatus* (Say) in the Sandia Mts., but the exact locality is forgotten. The young *Pyramidula* doubtfully listed as *strigosa* may be a form of *P. hemphilli*. No *Ashmunella* was found.

It is somewhat surprising that the *Euconulus* of New Mexico is not the Texan race, but the Northern *fulvus*.

¹ Nautilus, 1890, p. 102, the pale greenish form. T. D. A. C.

Shells from recent flood debris of Arroya Pecos, Las Vegas, N. M.

A series of shells lately collected by one of us gives the following species. The source of the shells is unknown, until the Arroya is followed up and their station found. In wanting *Ashmunella*, and in the abundance of *Bifidaria*, the assemblage is unlike that of the adjacent mountains.

Vallonia cyclophorella Anc.	Bifidaria pilsbryana Sterki.
Coellicopa lubrica (Müll.).	Vertigo ovata Say.
Pupoides marginatus (Say).	Zonitoides arboreus (Say).
Pupoides hordaceus (Gabb).	Euconulus fulvus (Drap.).
Pupa blandi (Morse).	Helicodiscus lineatus (Say).
Bifidaria armifera (Say).	Limnæa humilis Say.
Bifidaria holzingeri (Sterki).	Planorbis parvus Say.
Bifidaria hordeacella (Pils.).	Physa sp., broken.
Bifidaria procera (Gld.).	

The specimens of *Bifidaria armifera* vary in length from a trifle over 3 mm. with $5\frac{1}{2}$ whorls, to fully 4 mm. with $6\frac{1}{2}$ whorls.

CONUS CONSORS SOWB.

BY CHARLES LE ROY WHEELER.

My attention has been attracted to the above species while identifying a mixed lot of cones from Zanzibar, embracing about four thousand specimens, from the fact that many collectors, and some museums, have in their collections specimens labeled "*Conus consors* Sowb." that are far from what Sowerby evidently figured under that name. But Tryon's description appears to authorize the errors in identification. I, therefore, offer the following description :

Conus consors Sowb., Thes. Conch., f. 492.

Spire concavely elevated, with shallow channel and revolving striae, delicately tessellated with orange, apex acute and of pinkish tint; body-whorl slightly depressed in centre and inflated above, grooved toward the base; ivory white, with an orange band below the center, and one above sometimes reaching to the shoulder, the upper part of this band more or less broken; aperture white; epidermis velvety, light brown, tough and very adherent.

The entire absence of dotted revolving lines and the constant orange color are characteristic features.

Dimensions : height 60, diameter 32 mm.; of others 59x32, 58x31, 56x31, 50x32, and 50x27.

The illustration in Tryon's Manual, Vol. VI, plate 15, fig. 96, is a good representation ; but the list of synonyms should probably be either placed under *C. magus* Linn. or recognized as veritable species.

**A NEW SPECIES OF BULIMULUS FROM COSTA RICA AND A NEW
SPIRACULUM FROM ASSAM.**

BY HUGH FULTON.

Bulimulus (Drymæus) inusitatus, n. sp.

Shell sinistral, elongate, narrowly perforate, thin, translucent, amber yellow throughout ; whorls $7\frac{1}{2}$, engraved with faint spiral lines ; nucleus with minute close-set crossed striæ ; aperture ovate ; peristome thin, lower portion slightly expanded ; columella reflexed at point of insertion nearly covering the umbilicus.

Alt. $29\frac{1}{2}$, diam. maj. 13, length of aperture $12\frac{1}{2}$ mill. Hab.: Costa Rica (Underwood).

Compared with *tropicalis* Morelet, the only other known reversed Drymæus. The present species is thinner, has half a whorl more and is easily separated by its different ground color and the absence of bands.

Spiraculum assamense n. sp.

Shell discoidal, flat above, very broadly umbilicated, dark brown with a few oblique stripes of a lighter color, encircled by four rows of hairs arranged in tufts, one being at the periphery, one above, and two below, the latter two are often worn off in older specimens ; whorls $4\frac{1}{2}$, slightly convex above, last rounded ; tube erect, short, inclined towards the apex, situated 2 mm. from the margin of the aperture ; peristome white, somewhat thickened, bordered by a narrow flange ; aperture oblique, circular ; operculum shelly, whorls 5.

Diam. maj. 14 mm., min. 12 mm., alt. 5 mm.

Hab.: Khasi Hills, Assam.

In most respects this species is very like *nagaensis* Aust. & Bedd., but can be easily separated by the position of the breathing tube,

which in *assamense* is much nearer the aperture. The operculum of *nagaense* does not appear to have so many whorls as our species, a large part of the central portion being quite flat and smooth. These characters appear to be constant in the numerous specimens I have examined of both forms.

DESCRIPTIONS OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY AND ADDISON GULICK.

Diplommatina uzenensis Pilsbry, n. sp.

Shell dextral, cylindric-oblong, pale brown or nearly white, finely, delicately and evenly costulate. Whorls 6, very convex, the upper 3 forming a short cone, the last whorl contracted, a little distorted, ascending in front. Aperture subcircular, nearly vertical, the peristome continuous, flatly reflexed, duplicate, having a thin lamina or second peristome close behind the lip in quite mature specimens. Columella concave, ending in a tooth, as usual. Palatal fold less deeply immersed than usual, lying to the left of rather than above the aperture.

Alt. 2.6, diam. 1.4, alt. and diam. of aperture 1 mm.

Nishigo, Uzen (Mr. Y. Hirase). Types no. coll. A. N. S., from no. 510 of Mr. Hirase's collection.

This species is the most northern yet known, I believe. It is decidedly larger than *D. pusilla* Martens, somewhat smaller than *D. nipponensis* Mölldff., which is its nearest ally. The sculpture is about the same as in *nipponensis*, but the cone of the spire is not nearly so long, the later three whorls being large, while in *nipponensis* the last two are wide, the four or five earlier strongly tapering. The palatal fold is further to the left in *D. uzenensis* than in *D. nipponensis*, and the aperture is comparatively larger.

Eulota callizona var. *maritima* Gulick and Pilsbry, n. var.

This name is proposed for the race inhabiting Awaji Island and other districts mentioned below, specimens from Fukura, Awaji, being the types. These differ from *E. peliomphala* and its varieties *brandtii*, *herklotsi* and *nimbosa* in the more conoidal form of the spire; from *E. callizona* and its varieties chiefly in pattern of coloration. These are as follows:

(a) Purple-brown, with light buff streaks.

(b) Corneous and buff with red-brown streaks, a narrow band above the periphery or none, often a dark umbilical patch.

(c) Banded (bands 02345, 00345 or 00305) with deep brown on a pale ground, and generally streaked with opaque buff, or without such streaks.

(d) Corneous, with some opaque, buff streaks above, no bands.

Pattern (a) resembles that of *E. peliomphala nimbosa*; (b) that of *E. callizona congenita*; (c) that of *E. peliomphala* or *peliomphala brandtii*; and pattern (d) that of *E. callizona hickonis*.

Alt. 20-22, diam. 30 mm.

Alt. 19, diam. 25.

We regard the var. *maritima* as very near the original stock which gave rise to *E. callizona* and its varieties, and as a connecting link between these and *E. peliomphala*.

It inhabits Awaji Island, the adjacent shores of the Kii channel on the east, all of Shikoku Island, some parts of the east coast of Kiusiu, and the west end of Hondo, and intergrades on the shore of the Inland Sea with *congenita*, *hickonis* and *amaliæ*.

Eulota luhuana idzumonis Pilsbry and Gulick.

Shell large and solid, with the color-patterns of *E. quæsita* or *perryi*, dull, roughly sculptured with irregular growth-wrinkles, and differing from *luhuana* in the more capacious, less depressed form, and the umbilicus, which is decidedly wider and much more open inside than in *luhuana*. Alt. 30, diam. 43 mm.

Types from Takeya, Idzumo. It has affinities with *senckenbergiana* and the following variety.

Eulota luhuana var. *aomoriensis* Gulick & Pilsbry, n. var.

Shell smooth and glossy, pale buff with deep chestnut bands 00305 (or sometimes 00000, or with wide pale, diffuse bands in place of 2 and 4, as in *E. peliomphala herklotsi* or *E. quæsita perryi*), the spire moderately conoidal, whorls 5, the last capacious; umbilicus deep and more open within than in *luhuana* or *senckenbergiana*. Aperture oblique, the peristome white or reddish, nearly in a plane, but a little advanced sometimes at the termination of band 3.

Alt. 25, diam. 40 mm. (Chojamura.)

Alt. 20, diam. 32 mm. (Asanai.)

Chojamura and Gonohe, Mutsu; Asanai, Ugo (Mr. Y. Hirase).

A more globose and smoother form than *E. luhuana*, and more northern in distribution, inhabiting the northern extremity of Hondo, in Aomori *Ken* or prefecture.

It may be noticed in this connection that towards the north, *h. quasita* becomes smoother and more glossy than toward the southern limit of its range in middle Hondo.

Trishoplita goodwini var. *kyotoensis* Pilsbry, n. v.

Shell rather narrowly umbilicate, thin, somewhat translucent, pale brown throughout, glossy, striatulate, but without spiral lines. Spire low-conic; whorls 5, convex, the last rounded at the periphery, hardly descending in front. Aperture oblique, rounded, about one-fourth of its circumference excised at the parietal margin; peristome narrowly but distinctly expanded, thin, pale. Alt. $5\frac{1}{2}$, diam. $8\frac{1}{2}$ mm.

Kyoto (Mr. Y. Hirase).

This form resembles *T. goodwini* var. *fusca*, but the umbilicus is smaller, there is a half whorl less, and no spiral striæ, which in *fusca* are visible on the base. It is decidedly less conical than *Trishoplita conospira* Pfr. as defined by von Martens, and has a whorl less.

EULOTA MERCATORIA AND E. CALIGINOSA.

These species were treated as distinct in the *Manual of Conchology*, Vol. VI, but in dealing with them in the *Catalogue of Marine Mollusks of Japan* issued by Mr. F. Stearns and myself, I seem to have lost sight of the real differences between them, the intergradation I saw being a matter of color and size rather than of the details of form.

The receipt of a large series of specimens gives opportunity to correct the error I committed of lumping these really distinct species.

Eulota (*Euhadra*) *mercatoria* ('Gray' Pfr.).

This species varies in size from 26 to 38 mm. diam., and in color from a pale yellowish-brown to red-chestnut and blackish-chestnut, always with a narrow dark peripheral band bordered with yellowish on each side. In some light forms there is a dark umbilical patch. The pattern therefore varies from that of the *E. succincta* group to the *perryi* or *herklotsi* pattern. The periphery is more or less angular; the base is evenly rounded, and the lower lip in consequence is regularly curved.

Pfeiffer's figure of his type is excellent (Conchyl. Cab. *Helix*, pl. 132, figs. 1, 2, copied in Man. Conch. VI, pl. 31, f. 26, 27). I have figured a smaller specimen in Catal. Mar. Moll. Japan, pl. 10, fig. 5 (by error said to be $17\frac{1}{2}$ mm. diam. in the text, p. 162). *E. mercatoria* occurs on Okinawa.

E. mercatoria atrata n. var.

Much larger than *mercatoria*, very dark colored, and strongly ribbed or costulate; periphery subangular in front. Whorls $6\frac{1}{2}$ to $6\frac{3}{4}$, the last shortly deflexed in front; lip purple-brown, evenly arcuate, not sinuous. Alt. 35, diam. 50 mm.; alt. 32, diam. 46 mm.

Received from Mr. Hirase as from the Loo Choo Is.; from Mr. Stearns as from Okinawa. It is represented in the Cat. Mar. Moll. Jap., pl. 10, f. 4.

Eulota (Euhadra) caliginosa (Ad. & Ree.).

This species differs from *E. mercatoria* in the narrower, more slowly increasing whorls, the last one more swollen below the suture; the *flattened base*, producing a straighter basal lip; in the different shape of the aperture, and especially in the narrower lip, *which is sinuous below*, being curved forward at the middle of the basal margin. It is not so solid a shell as *E. mercatoria*, is rounded at the periphery, and has much the coloring of the lighter specimens of *mercatoria*, though the ground is generally yellower. The pale border above the peripheral band is often not well developed, and sometimes it is yellow throughout except the peripheral band.

In the Catal. Mar. Moll. Jap., this species is excellently represented in figures 1, 2, 3 and 6 of plate 10.

It was supposed by Adams and Reeve to be from Mindanao, but there can be no doubt that it is a species of the Loo Choo (Okinawa) fauna.

ON A GENUS (PHYLLAPLYSIA) NEW TO THE PACIFIC COAST.

BY WM. H. DALL.

The Rev. Dr. Geo. W. Taylor, of Wellington, British Columbia, has recently forwarded to me some marine slugs which were found on floating sea-grass near Nanaimo, Vancouver Island. An examination shows that these animals represent a genus, *Phyllaplysia*, not hitherto known except in Southwestern Europe, and an undescribed species.

The animal in most respects differs very little from *P. lafonti* Fischer, the type of the genus. It is subtranslucent, smooth, of a uniform pale lemon-yellow color, very much flattened, resembling some of the Planarian worms. The specimens sent by Dr. Taylor are presumably somewhat contracted by alcohol, which may account

for the form of the rhinophores and tentacles, which are short, conical, and strongly transversely wrinkled, but without tuberculation or color pattern, being of the same pale yellow as the rest of the body. The "rainure" extending from the right tentacle to the branchial opening is a plain line barely perceptible; the branchial pit with two minute lobes is short and in about the same relative position as in *P. lafonti*. The body is much depressed and the margins thin, sharp and even. The eyes appear as conspicuous small black spots in front of the bases of the posterior tentacles. The general form is elongate oval, the ends of the rhinophores, unlike the tentacles, are blunt, and these organs are sulcate inferiorly as usual. The length of the largest specimen, as contracted in alcohol, is about 20 mm., and the breadth about 9 mm. I propose for it the name of *Phyllaplysia taylori* in honor of its discoverer.

Of the three other species known, *P. lafonti* is pale green, with darker bands and numerous violet spots; *P. depressa* is green-buff, variegated with black; and *P. limacina* is of a dusky green. All of these are from western and southern Europe.

A NEW SPECIES OF PLEUROBRANCHUS FROM CALIFORNIA.

BY WM. H. DALL.

Some time since Mrs. Oldroyd sent me two specimens of *Pleurobranchus*, from San Pedro, which I could not spare time to examine microscopically at the moment. I can now specify their chief diagnostic characters as follows:

***Pleurobranchus californicus*, n. sp.**

Animal when fresh of a waxen white, with a surface apparently smooth, or rather like the skin of an orange, not tuberculate, but, under a glass, showing obsolete distant pustules hardly raised above the general surface; body elongate-oval, the foot longer than the mantle behind. The gill short, its stem finely granular, not tuberculate, with ten or eleven alternate short vanes, the whole adnate nearly to the tip, medially situated, with the contiguous genital orifices just in front of its anterior insertion and the anus just over the posterior insertion between the gill and the mantle. Eyes, rhinophores, muzzle, jaws and teeth, as described by Pilsbry, for the Gulf of California species collected by Fischer (Man. Conch., xvi, pp. 201-2). Shell rather long and narrow, subrectangular, longi-

tudinally obsoletely striate on the left side, obscurely obsoletely punctate near the anterior edge, and covered with a very thin periostracum which reflects nacreous tinges of color. The shell itself is white and thin, with a small spiral nucleus; the left margin somewhat recurved, the central part moderately convex; the whole extends more than half the length of the body and measures 12 by 6.5 mm.

This species differs from *P. digueti* Rochebrune in color, in the proportional size and number of pinnules of the gill, in having a larger and differently shaped shell, and in the position of the anal orifice. These remarks apply to the form described by Pilsbry anatomically; Rochebrune states that his species was scarlet above and whitish below, but gives no anatomical data.

GENERAL NOTES.

Dr. Jousseaume publishes a monograph of the Clausilioid group *Nenia* in the current number of the Bull. Soc. Philomathique de Paris (1900). Among other novelties introduced in the same paper is a supposed new genus *Bonnanius*, which seems to be the same as *Passamaella*, a curious Buliminoid group of Socotra.

MOLLUSKS IN GRASS.—Mr. Virginius H. Chase recently sent me from Valley township, Stark Co., Illinois, a piece of sod thickly covered with growing grass, and which was fairly alive with living pulmonates. The piece of sod was eight by four inches in size, and from it I picked the following specimens and species:

1. *Polygyra monodon* Rackett.
2. *Pyramidula striatella* Anthony.
136. *Bifidaria armifera* Say.
5. *Bifidaria contracta* Say.
1. *Bifidaria pentodon* Say.

The locality from which the sample came was a moist prairie. If this number was collected in a piece of ground less than a foot square, what must the whole prairie have contained!—FRANK C. BAKER.

In the early seventies Prof. Verrill dredged a minute bivalve off New Haven and gave the name *Gastranella tumida* Verrill to it. Since then it has been unknown until some of my minute materials

revealed one specimen from Summerside, P. E. I., and two specimens from Woods Holl, Mass. This indicates a wide distribution.—HENRY W. WINKLEY.

SHELL COLLECTING ON THE MOSQUITO COAST.—The following extract is from a letter to Mr. S. Raymond Roberts, from a former Ohio collector. *Wounta Haulover, Nicaragua, Sept. 27, 1900.* This coast, for twenty miles back from the sea, is a net-work of lagoons, rivers, creeks, channels. The “dry” land is mostly swampy, inundated, or partly so, during the wet season. In fact, this Mosquito Coast, which upon the map is so firm and solid-looking, is in reality a Dismal Swamp, multiplied by about five. Hence, so far as I am able to judge, it is not a good locality for *Bulinulidæ* and other land shells. Back from the sea, say twenty miles, and also south and west of Bluefields, where the land is more elevated, I believe there is better collecting. Right down here on the very coast I have found but four species, one of which I afterwards lost. *Bulinulus corneus* Sowb. I found plentiful at Bluefields. Also another lot, which I take for *Stenogyra octona* Linne, I found in abundance. Another shell, presumably a *Pupa*, was collected sparingly. These last two also in Bluefields. Here, Wounto Haulover, is a good locality for *Littorina columellaris* D’Orb., and *Principulka*, just twenty miles south of here, is an ideal place for superfine *Donax cayennensis* Lam.—WILLIAM H. FLUCK.

PUBLICATIONS RECEIVED.

A DESCRIPTIVE ILLUSTRATED CATALOGUE OF THE MOLLUSCA OF INDIANA, by R. E. Call, Ph. D. (24th Annual Rep. of the State Geologist for 1899, Indianapolis, 1900). “This catalogue is intended to be complete and to fully exhibit the present state of knowledge concerning the group of which it treats, as presented in the fauna of Indiana.” It is accompanied by a bibliography, and illustrations of the species. The latter are reproduced from the Smithsonian series “Land and Fresh-water Shells of N. A.,” except the Unionidæ, most of which were drawn by the author. The figures only rarely represent Indiana specimens, and are rather rough.

Fifty species of land shells are enumerated, 55 aquatic gastropods, and 110 bivalves. The table of distribution shows the Ohio and

Wabash basins to be by far the richest in species, the Lake Michigan basin poorest, though with a good representation of *Limnæidæ*.

The catalogue is interesting and useful, though it would be better, we think, if Dr. Call had followed modern classification, and had adopted the rectifications regarding many species which have been made in the last decade. He apparently thinks that progress in the anatomical and systematic study of Mollusks abruptly stopped fifteen or twenty years ago, as no innovations of later date are adopted, except a few, mostly wrong, made by himself. Aside from these matters, there are but few errors, and these not of grave consequence; a figure of *Strobellops* is given for *Zonites fulvus* (p. 376); *Tebennophorus dorsalis* is said to be "the most common slug in Indiana," though we think what he had was dark *Agriolimax campestris*. We note also that the descriptions of Lamarck's *Unios* are quoted not from the original but from the Deshayes edition, and the accents of the French remarks are badly "balled up."—H. A. P.

UNIONIDÆ OF INDIANA.—In Mr. Call's *Descriptive Catalogue of the Mollusca of Indiana*, the author repudiates the attempt at a natural classification of the Unionidæ made in Mr. Baker's *Mollusca of the Chicago Area*, and cannot realize that such a system is proposed seriously. He cannot understand why, for instance, such a form as *Unio trigonus* is placed in the same subgenus as *Unio plicatus*.

Now it is a fact that has been repeatedly demonstrated by Dr. Lea's, Dr. Sterki's and my own observations of the anatomy of these mollusks that *Unio trigonus* and the allied forms, the different species of the *Plicatus* group, *Unio pustulosus* and its allies, *Unio coccineus*, *U. subrotundus*, *U. kleinianus*, and the forms belonging to the *Chickasawhensis* group which have been placed in the genus *Quadrula*, all have the embryos contained in all four of the gills, and when they are thus filled they form thick, smooth pods. And there are certain conchological characters which hold good in all these species. Their shells are all solid, short, more or less inflated; they generally have a wide, flat hinge plate and almost invariably deep beak cavities. Many specimens occur among species belonging to the *Plicatus* group in which the plications are nearly or even wholly wanting, and the epidermis varies from greenish to brown and black. Such specimens are not far removed conchologically from the smoother forms of the *Pustulosus* group or from *U. subrotundus* and *U. kirtlandianus*.

The true Unios, which in the United States are well represented by such forms as *U. complanatus*, *U. buckleyi*, *U. crassidens* and *U. gibbosus*, have longer shells than the Quadrules, they are generally less solid, and as far as I have seen, the beak cavities are comparatively shallow, while the hinge plate is never wide and flat as in *Unio pustulosus*. In these the embryos are found in the outer gills only.

Mr. Call uses the time honored names *Unio*, *Margaritana* and *Anodonta* for the Indiana Unionidæ. These names are applied in a subgeneric sense, but he neglects to tell us what genus he places them under, whether it is *Unio* of Retzius or the *Margaron* of Lea. In his artificial key to the groups of *Unio*, excluding *Anodonta* and *Margaritana*, he places the species in groups, typified by *U. luteolus*, *U. ligamentinus*, *U. crassidens*, *U. tuberculatus*, *U. personatus*, etc. These groups have been recognized as natural assemblages by Lea, Lewis, Marsh, Wetherby, and most of the other American students of the Unionidæ. I consider them as natural and reasonable as any that can be made among large assemblages of nearly related species, and every amateur who gets together a collection of naiades begins to perceive them after a little study. Yet Mr. Call seems to consider them as mere artificial or laboratory devices of little value.

The *Anodonta edentula* of Say is placed by Mr. Call in the genus *Anodonta*. In this remarkable species there are more fully developed vestigial hinge teeth than in any of the true anodontas, and the hinge plate is incurved in front of the beaks, while in *Anodonta* proper it is evenly curved throughout. This species carries the young in the outer gills in short, distinct ovisacs running directly across the gill, instead of in long ovisacs running vertically, as in the true anodontas. These contain from 8 or 10 to 20 or more embryos and finally break out through the outer walls of the outer gills and are discharged entire, with their contents, into the water. After this the gills assume the ordinary unionoid form. It is probable that a few other species from the southern states which have been placed in *Margaritana* have similar marsupia. I have examined gravid specimens of most of our American anodontas and of the *A. woodiana* Lea of China, and in all of them the marsupia are radically different from that of *A. edentula*.

Mr. Call's synonymy of *Unio clavus* Lamareck is certainly astonishing, and includes species as different in shell characters as can be found among the North American unios.—C. T. S.

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No. 9.

NEW VARIETIES OF *PHYSA ANCILLARIA* SAY.

BY BRYANT WALKER.

Physa ancillaria var. *magnalacustris*.

Shell subglobose, thick, solid, semi-opaque; incremental striae fine, stronger toward the suture and somewhat irregular; transverse striae very minute or subobsolete; purplish-horn color, darker toward the apex, which is dark brown or black; body whorl with one or more broad white varicose bands, more or less suffused with white toward the lip and at the base; whorls 5, regularly and rapidly increasing, the first minute, the last very large, regularly rounded, not shouldered, the greatest width being in the centre; spire slightly elevated, acute; suture but slightly impressed, margined below with white; aperture large, expanded below so that the greatest width is below the centre; outer lip thin, sharp, more or less expanded and broadly rounded below; thickened within by deep yellowish-brown or liver-colored callus, which appears externally as a broad white band, extremities connected by a thin callus, which is broadly reflected over the body whorl; columella white, straight, scarcely twisted.

Alt. $12\frac{2}{3}$, diam. 11, length of aperture $11\frac{1}{2}$ mm.

Alt. $17\frac{1}{2}$, diam. $12\frac{1}{2}$, length of aperture, $14\frac{1}{2}$ mm.

Alt. $13\frac{1}{2}$, diam. $10\frac{1}{2}$, length of aperture $10\frac{1}{2}$ mm.

Types from Frankfort, Benzie County, Michigan. It has also been found at Charlevoix, Beaver Islands, Mackinac Island, Mackinaw City and Port Austin, Huron County, Michigan. These localities indicate distribution along the coast-line of the upper part of the lower

peninsula from Saginaw Bay on the Lake Huron shore to nearly as far south on the Lake Michigan coast. This form is the characteristic *Physa* of the lake shore, and is commonly found clinging to the large stones along the rocky or stony beaches. Its thick wine-colored or purplish shell with prominent white varicose bands, basally expanded aperture, and the regularly curved outline from the apex to the columella, give it an aspect peculiarly its own, and render it easily distinguishable from the typical form or any of the allied species. Specimens from the Beaver Islands, Lake Michigan and Mackinaw City on the mainland, while retaining the peculiar form, are thinner, more inclined to be horn-colored and have a narrower marginal band, which internally is red rather than brown, and in these respects seem to connect the variety with the typical form. Were it not for these intermediate examples, there would be good ground for considering the form worthy of specific rank.

Physa ancillaria var. *crassa*.

Shell oval or obovate, thick, solid, opaque, smooth, shining, longitudinal striæ very fine, transverse striæ minute or subobsolete; white, more or less tinged with vinous or pale purple; darker toward the apex, which is dark brown; whorls 4-5; regularly and rapidly increasing, the first minute, the last very large, roundly shouldered and frequently flattened laterally; spire short, scarcely elevated above the general contour of the shell; suture but slightly impressed, bordered below with white; aperture large, but slightly shorter than the shell; widest in the centre, somewhat narrowed below and slightly effuse at the junction of the basal lip with the columella; outer lip broadly rounded, thin, acute, thickened within by a strong callus which is yellowish-brown within and white externally; interior of body whorl light yellowish-brown or liver color; extremities of lip connected by a thin callus which is broadly reflected over the body whorl; columella strong, white, nearly straight, but slightly twisted.

Alt. $17\frac{1}{2}$, diam. $12\frac{1}{2}$, length of aperture 14 mm.

Alt. 16, diam. $12\frac{1}{2}$, length of aperture $13\frac{1}{2}$ mm.

Alt. 15, diam. 11, length of aperture $13\frac{1}{2}$ mm.

Higgins Lake, Roscommon County, Michigan.

This form, while related to the variety *magnalacustris* in its texture, differs entirely in its shape, which is quite similar to the typical form in the roundly-shouldered body whorl, and more elongated and

less expanded aperture. The lip joins the body-whorl at a more obtuse angle and lacks the basal expansion characteristic of the lake form. The spire is also less produced. Compared with the typical form, this variety is easily distinguished by its heavy, solid, opaque shell.

NEW PISIDIA.

BY DR. V. STERKI.

Pisidium tenuissimum, n.

Rather small, little to strongly oblique, moderately to rather well inflated, with the edges usually acutish, elongated or rather short, rhomboid to oblong-ovoid in outline, hinge margin little, inferior moderately curved, posterior end rounded or subtruncate obliquely in a postero-anterior direction with a rounded angle above; anterior more or less curved, truncate obliquely with the rounded-angular end inferiorly, or the whole anterior part rather regularly parabolic, with the end in the longitudinal median line; beaks slightly posterior, somewhat broad, moderately elevated over the hinge line, somewhat mammillar; surface very finely, almost regularly striated, highly polished; color horn to smoky, or to greenish, or to light grayish; shell very thin, translucent; hinge very fine, plate very narrow, cardinal teeth very small, short, thin, scarcely or slightly curved; those of the left valve very close together, longitudinal-parallel, the upper little posterior; lateral teeth rather long, markedly straight, slender, thin, with short cusps; also the outer ones in the right valve quite distinct; ligament fine.

Long. 3.4, alt. 2.8, diam. 2.1 mill.

Habitat: Straits and Orchard lakes, in Oakland Co., Michigan,¹ collected by Messrs. Walker and Sargent; Pine Lake, Marquette Co., Mich. (Upper Peninsula), and other waters in the same state; also seen fossil.

As pointed out in the description, the species is very variable in shape, and extreme forms, if found separate, might well be taken for different species. The one from Pine Lake (collected by Mr. Walker) is especially notable: the beaks are narrower and more

¹ Close together, but at the heads of different river systems.

elevated; the anterior part of the mussel is more rapidly and directly tapering to a rounded point, the color is light grayish with concentric, irregular, narrow zones of a darker shade. Some forms have resemblance with *P. splendidulum*, the more rhombic ones, with a corresponding form of *P. pauperculum*, but in case of doubt, the thin shell and very fine hinge with the markedly straight, slender lateral teeth will distinguish our species.

Specimens have occasionally been seen for several years, from different places, both recent and fossil, yet it seemed not safe to establish a n. sp. upon them. The recent finds of Messrs. Walker and Sargent have put an end to all doubts.

Pisidium monas, n.

Minute, rather well inflated, oval in outline, without any projecting angles, except a very slight one at the scutum, and the slightly pointed, rather inferior, anterior end; beaks little posterior, broad, rounded, little elevated; surface with comparatively coarse, microscopic, rather regular striæ, tops of beaks smooth and shining; shell thin, hinge fine, cardinal teeth very small, almost straight, longitudinal, the posterior (upper) of the left valve sometimes almost obsolete; ligament small.

Long. 1.7, alt. 1.4, diam. 0.9 mill.

Habitat: Mountain Lake, Marquette county, Michigan, collected by Mr. Bryant Walker.

Among the specimens seen (some twenty), little variation was noticed; the species may be recognized by its minute size and its shape, the low, comparatively broad beaks, and the somewhat coarse striation. The latter is about as in *Pis. punctatum*, small forms of which are also of about the same size; but the latter *Pisidium* is more inflated, more angular in outline, its beaks are narrower and more elevated. *P. monas* is also smaller than *imbecille*, and less elongated, its striation is coarser.

Being known from but one locality, the species has been established only after a most careful examination and comparison with *P. punctatum*, *imbecille*, *harfordianum*, *handwerki*, as well as with the young of the other species occurring in the same lot.

Pisidium streatori, n.

Of medium size, almost equipartite, short oval-rounded to almost circular, without any projecting angles, or with a slight, rounded one to the scutum, moderately inflated, lentiform; beaks slightly pos-

terior, low, rounded, scarcely or little elevated over the hinge margin, approximate; surface with moderate to rather coarse, irregular striae, and usually a few coarser lines of growth, shining; color light yellowish horn, to straw or slightly reddish; shell rather thin, somewhat translucent; hinge rather fine, plate narrow; cardinal teeth well formed, the right one strongly curved, or angular, its posterior part thickened, simple, or grooved, or split in two diverging parts; the left anterior is angular, the posterior is oblique, slightly curved, short to rather long; lateral teeth rather small, little projecting into the cavity of the mussel, but well formed, the cusps short, pointed; ligament moderate.

Long. 5, alt. 4.4, diam. 2.5 (New York and some Ohio exs.).

Long. 5.5, alt. 4.8, diam. 3.4 (large Ohio ex.).

Habitat: Canaseraga river, N. Y.; Garrettsville, Ohio, in a swamp.

A lot of good specimens, from the former place, were kindly sent by Mr. Hy. Prime, in 1894, and then regarded as new, yet retained, as it might have proved to be a local form of some other species. Last fall Mr. Streator and the writer collected some specimens of exactly the same *Pisidium*, in a dried up swamp near Garrettsville, Ohio, the mussels living and propagating in the damp muck, under dead leaves, etc. Later on we found that Mr. Streator had collected quite a number during several years previous.

Our species is well characterized, and can not be mistaken for any other *Pisidium*. *P. roperi*, with nearly the same color and surface appearance, is larger, more elongate, much more inflated, its beaks are higher and more voluminous in the adult. I take pleasure in naming the present species after Mr. Geo. J. Streator, an enthusiastic conchologist, who has, for many years, collected and studied the mollusca of northeastern Ohio.

SHELLS OF THE MARL-DEPOSITS OF AROOSTOOK COUNTY, MAINE, AS COMPARED WITH THE LIVING FORMS IN THE SAME LOCALITY.

BY OLOF O. NYLANDER.

In the part of Aroostook county underlaid by the Aroostook limestone of Niagara age, there are many deposits of shell marl. I have only examined two localities: Barren Brook Bog, in Caribou, and Lovely Brook Bog, in Fort Fairfield.

Barren Brook Bog, in Caribou, is covered by vegetation ; but the Lovely Brook Bog is wet, dangerous and difficult to approach, excepting in one place.

I have just received from Mr. Bryant Walker a paper upon the "Shells of the Marls of Huron County," reprinted from the Geological Survey of Michigan, Vol. VII, part II, pp. 247-252, in which comparisons are made with specimens from Aroostook county, Maine. To my knowledge there has been no extensive list published of the shells found in the marl deposits of Maine, and no comparison made with the living species in the same localities.

Samples of marls have been sent to me from Presque Isle, Limestone, California Town, in New Brunswick, Canada, and other places. The most abundant species are *Limnæa desidiosa*, *Planorbis parvus* and *Pisidium contortum*,¹ in all the localities.

Fossils in the Marl of Barren Brook Bog.

Vertigo sp. Fragments only.

Succinea obliqua Say. Rare.

Succinea ovalis Gld. Rare.

Physa heterostropha Say. Rare.

Limnæa desidiosa Say. Abundant.

Planorbis trivolvis Say. Common.

Planorbis companulatus Say. Rare.

Planorbis bicarinatus Say. Rare.

Planorbis parvus Say. Abundant.

Planorbis (?). One specimen related to *P. crista* Lin., probably a new species.

Ancylus parallelus Hald. Two specimens only.

Valvata sincera Say (?). Not common.

Anodonta fragilis Lam. Rare.

Sphærium simile Say. Rare.

Sphærium rhomboidium Say. Rare.

Calyculina securis Prime (?). Rare.

Pisidium adamsi Prime. Few.

Pisidium compressum Prime. Few.

¹ Dr. V. Sterki has kindly examined all the *Pisidia* in my collection. Some of the specimens are still held by him, pending the receipt of more material for comparison with specimens from other parts of America and Europe. I am under the greatest obligations to him, and also to Mr. Bryant Walker, for valuable information.

Pisidium contortum Prime. Abundant.

Pisidium pauperculum Sterki. Rare.

Pisidium rotundatum Prime. Not common.

Pisidium scutellatum Sterki (?). Rare.

Pisidium variabile Pme. Rare.

Pisidium ventricosum Pme. Common.

Pisidium walkeri var. *mainense* Sterki. Rare.

Living shells in Barren Brook, one quarter of a mile below the marl deposit, in a small pond on the brook, the land shells obtained at the water's edge.

Succinea obliqua Say. Rare.

Succinea ovalis Gld. Common.

Succinea avara Say. Rare.

Strobilops labyrinthica Say.

Bifidaria pentodon Say.

Vertigo ventricosa Morse.

Conulus fulvus Müll.

Zonitoides arboreus Say.

Zonitoides exiguus Stimp. Common.

Carychium exile Lea. Common.

Physa heterostropha Say. Rare and small.

Limnæa desidiosa Say. Small compared with the fossils.

Planorbis trivolvis Say. Abundant.

Planorbis parvus Say. Common.

Planorbis crista Linné, var. *cristata* Drap. Common.

Anodonta fragilis Lam. Rare.

Sphærium simile Say. Common in the brook below the pond.

Sphærium rhomboideum Say. One small living specimen.

Pisidium abditum Hald. Rare.

Pisidium compressum Prime. Few where the road crosses the brook.

Pisidium rotundatum Prime. Rare.

Pisidium splendidulum Sterki. Abundant; type locality.

Pisidium variabile Prime. Abundant.

Pisidium seminulum Sterki?. Few specimens referred to this species.

Pisidium ventricosum Prime. Common.

Pisidium walkeri var. *mainense*. Common.

*Fossils in the Marl Deposit in Lovely Brook Bog,
Fort Fairfield, Aroostook County, Maine.*

Physa heterostropha Say. Large, specimens rare.

Limnæa desidiosa Say.

Planorbis parvus Say.

Planorbis hirsutus Gld. Rare.

Planorbis crista Linné, var. *cristata* Drap. One good specimen.

Pisidium variabile Prime.

Pisidium abditum Hald.

Pisidium splendidulum Sterki.

Pisidium ventricosum Prime.

Pisidium contortum Prime.

Living Shells in the Lovely Brook Bog.

Physa heterostropha Say. Rare.

Limnæa desidiosa Say. Rare.

Pisidium variabile Prime. Common.

Pisidium ventricosum Prime. Small but abundant, especially on the marl deposit.

Pisidium splendidulum Sterki. Common and very variable.

Pisidium medianum var. *minutum* Sterki. The type locality; small but very fine specimens.

Pisidium contortum Prime, so abundant among the fossils, is one of the rarest living *Pisidia*. Only a few specimens have been collected in Mud Lake, in the northeast corner of Perham, Aroostook County, Maine. It is dangerous to go near the water's edge, as the boggy shores break through and one sinks in the mud.

PUBLICATIONS RECEIVED.

CONTRIBUTIONS TO THE TERTIARY FAUNA OF FLORIDA, with especial reference to the Silex beds of Tampa and the Pliocene bed of the Caloosahatchie River; including in many cases a complete revision of the generic groups treated of and their American tertiary species. By WILLIAM HEALEY DALL, A. M. Transactions of the Free Institute of Science, Philadelphia, Vol. III, Part V, Dec., 1900.

This part contains about 270 pages, and 12 plates, treating of the families *Solenidæ*, *Donacidæ*, *Psammobiidæ*, *Semelidæ*, *Tellinidæ*,

Petricolidæ, *Cooperellidæ*, *Isocardiidæ*, *Cardiidæ*, *Diplodontidæ* and the *Leptonacea*; in all 145 new tertiary species are described.

This interesting work on the tertiary fauna contains so many changes in nomenclature that also affect the recent fauna, that it is looked forward to with as much, if not more, interest by the Conchologist than by the Paleontologist — the numerous generic and specific references, distribution of species, and synopses of genera, forming a very valuable feature to the student.

The first family discussed is the *Solenidæ*, which follows closely the synopsis of the recent species, published by Dr. Dall, in the *Proc. U. S. Nat. Mus.*, XXII, 107, which was reviewed in the *NAUTILUS* for Feb., 1900. In the *Donacidæ* the synonymy of the two common Californian species is given as follows:

1. *Donax Californica* Conrad, not of Carpenter and the majority of Californian authors, nor Deshayes. *Donax navicula* Hanley.

2. *Donax lævigata* Deshayes. *Donax Californica* Carpenter and several Californian authors, not of Conrad or Deshayes. *Donax obesa* Gould, not Orbigny.

The generic standing of the various genera constituting the family *Psammobiidæ* are fully discussed; the following genera being represented: *Psammobia*, Lam. (*Gari* of some authors), *Sanguinoluria*, *Amphichæna*, *Heterodonax*, *Asaphis*, and *Tagelus*; regarding the latter Dr. Dall says: "The genus *Tagelus* is distinguished from any of the *Solenidæ* by its long and distinct siphons."

A number of changes of familiar specific names have been made in the *Semelidæ*. For the *Semele reticulata* L. of authors (*S. orbiculata* Say) the name of *S. proficua* Pulteney, 1799, is adopted, the *reticulata* of Linné being based on an oriental species. *S. purpurascens* Gmel. has priority over both *obliqua* Wood and *variegata* Lam. *S. bellastrata* Conrad, 1837, is substituted for *cancellata* Orb., 1853. *Cumingia coarctata* Sowb. is recorded from Florida, the synonymy being given as follows: *Lavignon antillarum* and *petitiana* Orb.; *C. fragilis* and *sinuous* A. Ads., and *C. tenuis* H. and A. Ads.

An extensive discussion of the *Tellinidæ* is followed by descriptions of 51 new species.¹

Of the family *Petricolidæ*, four species are recorded from the

¹This family will be more fully discussed in a review of Dr. Dall's synopsis of the recent North American species.

Atlantic coast : *Petricola lapicida* Gml., *P. typica* Jonas, *P. pholadi-formis* Say, and *P. dactylus*, Sowb. In referring to the latter Dr. Dall gives the following interesting note : "The curious little shell named in 1872 by Verrill *Gastranella tumida*, is certainly a *Petricola*, and I suspect it to be the young of *P. dactylus*, which has when very young and fresh a purplish tinge on the umbones in some individuals. The tinge is precisely the same in both. Carpenter similarly took the nepionic young of *P. denticulata* Sowerby for a *Psephis* and described it under the specific name of *tellimyalis*. This was the more excusable, since the fry are brightly colored with orange and purple, while the adult and adolescent stages of the *Petricolaria* are pure white. I have a series showing the latter with its purple umbones strongly contrasting with the white valves, but this condition lasts only a short time, the color fading entirely out in most specimens before they attain full growth."

A most excellent synopsis of the Cardiidae is followed by a review of the species, of which 28 are new. *Cardium floridanum* Heilp, is a syn. of *C. emmonsii* Conr.; for *C. magnum* Born (not Linné), *C. robustum* Solander is adopted. *Cardium bullatum* of authors as of Linné not of Mörch, becomes *C. spinosum* Meuschen; *C. semi-sulcatum* Gray, has priority over *C. ringiculum* Sowb., and *C. Petiti-anum* Orb., *C. (Lævicardium) serratum* L., and *C. lævigatum* Lam., are considered synonymous.

A provisional table of the families and genera constituting the Leptonacea¹ is adopted. *Montacuta bidentata* Montg., and *Kellia planulata* Stimp., are both placed in the genus *Rocheportia* Vélain. *Lasæa rubra* (Montg.) is thoroughly discussed. Dr. Dall finds no permanent specific character to separate *L. bermudensis* Bush. "Small shells like *Lasæa* which attach themselves by a byssus to algæ, may be widely distributed by ocean currents. Differences of temperature and food cannot fail to make their mark upon the different colonies. When, in addition, we have a normal crudity and want of definition in the hinge characters throughout the genus, it would seem inadvisable to subdivide the type too minutely." *Montacuta elevata* Stimp, is placed in the genus *Aligena* H. C. Lea.

The work closes with the Diplodontidae; a synopsis of the recent

¹ A synopsis of the Recent and Tertiary Leptonacea of North America and the West Indies, was published by Dr. Dall in the Proc. U. S. Nat. Mus., xxi, pp. 873-897, 1899.

species in the Jour. of Conch., ix, pp. 244-246, Oct., 1899, was reviewed in the NAUTILUS, xiv, p. 34. Dr. Dall states that this part carries the text so far that it seems certain that another part will conclude the work.

NOTICES OF SOME NEW JAPANESE LAND SNAILS.

BY H. A. PILSBRY.

A recent sending from Mr. Y. Hirase, of Kyoto, Japan, contained a number of novelties, some of which are briefly diagnosed below. Illustrations will follow later.

Eulota (Aegista) mimula n. sp. Shell thin, openly umbilicate, depressed, with low-conic spire; brown, lustreless, rather weakly striate, and bearing sparse cuticular processes, like short, prostrate and adnate hairs. Whorls $5\frac{1}{2}$, convex, the last a trifle angulated in front, slightly descending to the aperture, rounded beneath. Aperture oblique, subcircular, the peristome whitish, narrowly expanded, subreflexed below, scarcely thickened, the margins approaching. Alt. 5.5, diam. 9 mm. Kyoto.

Much like a miniature *E. aperta*, but the spire is somewhat higher, the umbilicus rather less open, the striation less strong, and the peristome not thickened within.

Trishoplita cretacea var. *bi-partita* n. v. Somewhat smaller than *T. cretacea*, with conic spire, whitish above, brown or copiously streaked with brown below, a brown line ascending the spire bordering the suture above; surface striate and rather indistinctly granulate by the decussation of fine spirals. Aperture very oblique, rounded oval. Alt. 9, diam. 14.5 mm.; alt. 9.5 diam. 12.5 mm. Toyónishikami, Nagato.

In *T. cretacea* the minute granules are irregularly scattered, not produced by decussation as in this variety. In specimens from Ushirogawa, Tosa, Shikoku Island, which I refer to *T. cretacea* as a variety, the sculpture is also decussate, though very indistinctly so. *T. cretacea* v. *bi-partita* reminds one somewhat of *Helicella pyramidata*, from the form of the spire.

Eulota (Platitropis) elegantissima var. *cara* n. v. Larger than *E. elegantissima*, more depressed, with wider umbilicus and more rapidly widening last whorl. Alt. 10, diam. 29; alt. 7, diam. $20\frac{1}{2}$ mm. Loochoo Is.

Clausilia euholostoma n. sp. An exceedingly peculiar *Euphædusa*. The shell is very small, alt. 7.6, diam. 2.4 mm., with broadly oval (not in the least pyriform) aperture, continuous white peristome, and only a single lamella, the inferior, developed. This lamella is shaped as in *Cl. monelasmus* Pils. The principal plica and the lamella spiralis are extremely short and lateral in position; short upper and lower palatal plicæ are developed. There are about $7\frac{1}{2}$ whorls, the surface densely striated. The clausilium is Euphædusoid. Hab., Mikuriya, prov. Suruga (No. 563 of Mr. Hirase's register).

Clausilia japonica var. *interplicata* n. v. A dark colored, glossy variety, with several palatal plicæ developed between the usual upper and lower palatals of typical *C. japonica*. Nishigo, Uzen (No. 403 of Mr. Hirase's register). Other specimens from Takeya, Izumo, are less glossy, and irregular in the development of the "interpalatal" folds.

The following species belong to the section *Hemiphædusa*:

Clausilia perpallida n. sp. General form of *C. aurantiaca* var. *erberi*; pale corneous, finely striate. Superior lamella moderate, inferior receding, subcolumellar deeply immersed; closing apparatus lateral, the principal plica long, upper palatal well developed, a low, broad, nodule-like lunella below but not joining it; no lower palatal fold. Length 11.5, diam. 2.5 mm. Nishigo, Uzen (460 b of Mr. Hirase's register).

Clausilia harimensis n. sp. Similar to *C. aurantiaca* or a little more slender, but with the weakly developed peristome of *C. awajensis*, the lunella and closing apparatus generally being similar to that species, and lateral, not ventral as in *C. aurantiaca*. Whorls about 10; color greenish-brown, when unworn. Length 11.5, diam. 2.7 mm. Kashima, Harima. Types no. 79133 coll. A. N. S. (306 a of Mr. Hirase's register).

Clausilia hokkaidoensis n. sp. About the size and general form of *C. monelasmus*, with which it occurred. Whorls about 10, the last two striate. General characters of the aperture as in *C. subaurantiaca*, the subcolumellar lamella deeply immersed, closing apparatus lateral, the upper palatal fold well developed, not connected with the straight low lunella; no lower palatal fold. Much smaller than the allied *C. subaurantiaca*. Length 11, diam. 2.5 mm. Kayabe, Ojima, Hokkaido I. Types no. 79321 coll. A. N. S. (546 b of Hirase's register).

Clausilia iotaptyx var. *clava* n. v. General form of *Cl. iotaptyx*, the spire being abnormally thick above, though attenuated for half the length of the shell. Whorls 12, the last with a crest or ridge behind the peristome. Superior lamella moderate, inferior receding, not visible in a front view, subcolumellar emerging. Principal plica long, upper and lower palatal plicæ developed, a rudimentary lunella between them, not connected with the upper plica. Length 12.5, diam. 2.8 mm. Senzan, Awaji Island.

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No. 10.

A CONTRIBUTION TO WEST COAST CONCHOLOGY.

BY HENRY HEMPHILL.

Between San Diego and Point Conception, a distance of about two hundred miles, there lies off the coast of Southern California (not Lower California) a number of islands generally called the Santa Barbara group. In all, there are eight of these islands, varying in length from one to thirty miles and from one to six or eight miles in width, the nearest being about twenty-five, and the most distant about seventy-five miles from the mainland.

All of them bear the name of some saint whom tradition, superstition and religion have invested with supernatural power for good or evil toward men. Beginning with the most northerly island of the group and ending with the most southerly one, their names run as follows: San Miguel, Santa Rosa, Santa Cruz, Anacapa, San Nicolas, Santa Barbara, Santa Catalina, and San Clemente.

Here is an array of saintly names that should satisfy the most devout, and, if there is any virtue in a name, it should bring peace, hope and quiet rest to those whose lot might be cast upon these rock-ribbed and storm-beaten islands. But this does not seem to have been the case, for when they were first discovered by the old Spanish or Portuguese navigators, colonies of peaceful and, perhaps, happy Indians inhabited them, whose time and occupation in life was principally devoted to securing something to eat and very little to wear. Soon after the advent of the white man these poor creatures began to disappear, decreased in numbers, and finally became extinct. There still remain evidences of their home life, the shell heaps on their old

camping-grounds, an occasional broken stone-implement, and a few shell ornaments that have been over-looked by the white man in his search for curios or prehistoric relics.

Several theories have been advanced by scientists and others in regard to the origin and age of these islands, but I can add very little to these flights of the imagination. How often, if more than once, all or some of them have been submerged and raised above the sea level, or whether those of the group which are composed principally of metamorphic rocks are the remains of the highest peaks of a range of mountains that once formed or ribbed the most western part of the continent, it is quite impossible to say.

San Nicolas Island, however, is of sand-stone formation, and contains beds of marine fossils, the forms being similar to those now living all along the coast of the mainland, and I think we are safe in suggesting that this island was thrown up at or about the time the general elevation of the coast line and adjacent mesa-lands took place.

There are always some curious expectations associated in the human mind with thoughts of the islands of the sea. To the conchologist these expectations are often greatly multiplied, and these little isolated patches of land become intensely interesting, and especially so to the student of terrestrial mollusks, for the islands of the sea the world over are noted for their richness in land shells.

In this respect, our Californian islands are no exception to the general rule. While the number of so-called species found upon them, so far as we know them at present, is not very numerous, several are peculiar to these islands and not found elsewhere, while their coloring, varied through closely related forms, adds unusual interest and makes them very desirable for study, especially by those who are interested in problems of evolution.

The origin of the land shells of these islands and of the west coast generally has been the subject of speculation by various writers on the distribution of animal life for some years. In their attempts to account for the affinities and resemblances, in a few instances, between our land shells and some forms found in Asia, they have bridged over Bering Strait, or "Behring Straits," several times had bands of snails, or perhaps single ones "in pairs," as Pat would express it, cross this bridge into America, travel southward to Cape Horn, establish colonies all along this long line of travel, and subsequently spread eastward over the continent, and finally cross another imagin-

ary bridge into the West Indies; and the present shell fauna of this whole region is supposed to be the descendants of those Asiatic emigrants.

We are also to infer from these theorists and their writings, I suppose, that during the time this "dispersion" of Asiatic snails took place there was not a native terrestrial mollusk in all this land, no matter what other kind of organisms may have originated and existed here at that time.

In order to have a clear and comprehensive conception of life, the origin and development of the material forms of organisms, and their distribution over our planet, we must study them all from a fundamental standpoint, and I will here briefly allude to the fundamental as I understand it.

Time and space are infinite. Existing within the infinite there are elements that possess the properties of attraction and repulsion (energy—life), which, by their combinations, form two great factors that enter into and produce all the phenomena we see around us. These we know as energy and matter. Their relations to each other may be more clearly understood by stating that without energy matter could not be formed, and without matter energy could not demonstrate its presence, as it would have nothing to act upon, hence both are necessary to a demonstration of any kind, and must be regarded as equals in every respect. Development is a principle inherent in the elements—the hand-maid of life itself. Evolution, diversity and variation are natural processes belonging to development. These constitute the fundamental; they are coexistent and immortal, eternal, without beginning and without end. The fundamental alone is immortal; all the phenomena arising from the fundamental, the superficial and complex, are evanescent, fleeting and constantly passing away, even as the grass of the meadows and the forests of the plains, and are replaced by other similar phenomena, though varied in form. Development is the regular order of nature, and the regular order of development is from the simple to the complex and *vice versa* (disintegration). Wherever matter, heat, moisture and air exist together, there life (omnipresent energy, Howison), with her hand-maid development, will be found industriously refining and preparing inorganic matter, from which they will evolve organic forms in due course of time.

As the form and structure of terrestrial mollusks are not of a very

high or complicated nature, we may suppose that not many centuries would pass, after the Rocky, Sierra Nevada Mts. and the adjacent territory rose above the "Mesozoic Sea," before these creatures would originate, perhaps in many places at or about the same time; and as they multiply in numbers quite rapidly, under favorable conditions, there would have been a large native population of terrestrial mollusks existing here long before those Asiatic stragglers could have reached Cape Horn and the West Indies via Bering Straits bridge. If the present land shells of America are the descendants of Asiatic emigrants, what has become of the land shells that have originated here?

"Westward the course of empire takes its way" is as true as it is poetical, and if animals obey the same general laws that human beings do in this respect, then the snail emigration must have been the other way. We can as readily imagine bands of snails from America crossing this bridge at Bering Strait and establishing colonies on the other side as *vice versa*, and thus we could account for these resemblances and affinities by a westward movement as well as by an eastward emigration of these slow-moving creatures, if there were no causes or conditions in the environment in both countries to produce similar results in the organic structure of the same class of animals, which I believe is the case.

Without having investigated the matter very closely, I am under the impression that the resemblances and affinities of the West Coast shells, as well as those of America generally, are as close to those of Europe as they are to the shells of Asia. Compare the following American and European shells:

<i>American.</i>	<i>European.</i>
<i>Helix nickliniana</i> Lea.	<i>Helix arbustorum</i> Linn.
<i>Helix kelletti</i> Fbs.	<i>Helix aspersa</i> Müll.
<i>Helix levis</i> Pfr.	<i>Helix pisana</i> Müll.
<i>Helix inflecta</i> Say.	<i>Helix personata</i> Drap.
<i>Patula striatella</i> Anth.	<i>Patula ruderata</i> Stud.

Compare the entire *Zonitidæ* of both continents. Many of *Limnæidæ*, *Physidæ* and *Planorbidæ* on both sides of the Atlantic Ocean are identical, or so near alike that they could hardly be separated if mixed together.

I think, then, we may reasonably conclude that if the emigration

of animals is generally toward the setting sun, it would be more reasonable and more in harmony with this general law to base the distribution of animal life on a westward movement across each continent, spreading north and south as food and climatic conditions were found to be favorable to the existence of each class of creatures, rather than upon a haphazard exodus of animals from Asia via Bering Strait bridge.

Undoubtedly a few shells have been introduced into America from other continents, but, after two centuries of close commercial intercourse between America and Europe, we can count all the known introduced land shells on the fingers. I venture to suggest that the distribution of animal life is determined by the laws of attraction and repulsion as much as the revolutions of the earth in its orbit around the sun. There are life centres on each continent around which animals revolve, and from which they radiate and to which they return, with possibly a westward tendency of these life centres. In obedience to this law of attraction birds return each spring to their old nesting places; some fish, like the salmon, return each season to the rivers and creeks in which they were hatched to deposit their spawn, and many other circumstances of a similar kind might be cited in support of such a theory.

I have visited all of the islands off the coast of Southern California, except San Miguel and Anacapa, for the purpose of collecting shells, but before presenting a complete list of the land shells, I will offer descriptions of some forms that seem to be undescribed.

In referring to the Helices I use the general term "Helix," under which genus they have been described, and which, it seems to me, is quite as suggestive, and certainly as useful, as the long cumbersome names that have been recently adopted; leaving to others the choice of half a dozen or more genera and subgenera to which they have been referred from time to time by several distinguished eastern and foreign conchologists.

[*To be concluded.*]

A NEW AMNICOLA.

BY BRYANT WALKER.

Amnicola letsoni.

Shell small, elevated, solid, thick, white; subimperforate, whorls

$4\frac{1}{2}$, more or less flattened laterally and inclined to be shouldered; smooth; suture deep; spire short, less than one-third of the entire length, apex obtuse; aperture small, ovate, angled above, rounded below, flattened on the parietal margin, which is quite oblique to the axis. Peristome thick, continuous, entirely free from contact with the body-whorl in fully mature specimens.

Alt. $3\frac{1}{2}$, diam. $2\frac{1}{4}$, length of aperture $1\frac{1}{2}$ mill.

Alt. 3, diam. 2, length of aperture $1\frac{1}{2}$ mill.

Habitat: Goat Island, Niagara River, N. Y.

Amnicola sheldoni Pils. is the only species with which this can be compared. The present species, however, is to be distinguished by its flattened, shouldered whorls, deeper suture and more acuminate spire. Six mature examples were found which, though differing somewhat in the relative proportions of length and width, are, as a whole, quite uniform. In four of them, the peristome is distinctly separated from the body-whorl; in one, while continuous, it is so close as to be almost adnate, while in the remaining specimen, the parietal margin, although somewhat broken, seems to have been appressed to the body-whorl for a short distance. Associated with these specimens were two other examples quite similar, but much more cylindrical in outline, less solid, and with the aperture less angled posteriorly. Neither is quite mature, judging from the thinness of the lip. In view of the considerable variation in these particulars in other well-known species of the genus, such as *Amnicola lustrica* Pils. and of the few specimens now at hand, it is not deemed advisable at the present time to do more than call attention to the fact. Dr. Pilsbry, to whom some of the specimens were submitted, suggests that, like *Pyrgulopsis mississippiensis* Pils., it is probably an extinct species, and will be found in some quarternary bed along the Niagara or some tributary creek.

The type specimens were collected by Miss E. Jennie Letson, of Buffalo, N. Y., and the species is named in her honor.

EXOTIC MOLLUSKS IN CALIFORNIA.

BY JOSIAH KEEP.

In a recent pamphlet, Mr. R. E. C. Stearns speaks of twelve exotic species of mollusks that have been found in California. Sev-

eral of these are increasing rapidly. Recently two bright lads of our "Isaac Lea Chapter," Masters Doe and Gifford, brought me fine specimens of *Modiola plicatula* Lam. which they had found on the southwestern shore of San Francisco Bay. They also guided me to numerous colonies of *Urosalpinx cinereus* Say. on the Alameda shore, which they had naturally mistaken for the native *Ocenebra circumtexta* Stearns. They showed me several dead valves of *Venus mercenaria* Linn. which they had picked up on the same shore, but of which they had not been able to find living specimens. We cannot, therefore, certainly add this species to Mr. Stearns' list, but it is quite probable that living forms of the same will soon be found in deeper water.

Of the land species included with the twelve, two at least are becoming quite common. *Zonites cellarius* Müll. appeared abundantly the past season in the college garden, and *Helix aspersa* Müll. I have artificially propagated with much success, using a frame like a board-covered hot-bed, and feeding with cabbage leaves and similar vegetables. I have now introduced several native species into the frame and am awaiting the spring-time with much interest. *Helix californiensis* Lea does not thrive, as it evidently sighs for the sands of Monterey and the toothsome rattle-weed; but its near neighbor, *Helix dupetithouarsii* Desh., from Cypress Point, seems quite at home, and is as happy as if it were shaded by the venerable trees on that rocky promontory. Possibly it is because the frame is sheltered by a hedge of tall cypresses, lineal descendants from the trees on Cypress Point. I have often wished that the long and cumbrous name of this species could be changed to the short and highly-suggestive one, *Helix cupressa*, the cypress snail. But I suppose that the law of priority is like the law of the Medes and Persians, "which altereth not."

Mills College, Cal.

NOTICES OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY.

Clausilia Hiraseana n. sp. A *Megalophædusa* with the size and general form of *Cl. japonica*, but *strongly sculptured with rib-striæ*, far coarser than in any other known Japanese species. The sub-

columellar lamella is immersed and there are four strong palatal plicæ. Length 29, diam. 6 mm. Okinoshima, prov. Tosa (Y. Hirase).

Trishoplita Smithiana n. sp. Shell about the size and color of *T. goodwini* (Smith), but much more depressed, the spire low, convexly conic, whorls $5\frac{1}{3}$, the last angular at the periphery, descending in front; sculpture of slight growth-wrinkles and extremely fine, crowded spiral striæ. Aperture transversely oval, oblique; peristome thin, expanded, reflexed below, the margins approaching, parted by a parietal wall in length about one-fifth the circumference of the peristome. Umbilicus open. Alt. 8, diam. 13, width of umbilicus 2 mm. Arakura, prov. Tosa (Mr. Hirase). Much more depressed than *T. goodwini*, with lower spire and wider umbilicus. named for Mr. E. A. SMITH, who has given us several valuable papers upon Japanese mollusks.

Ganesella myomphala var. *omphalodes* n. v. Similar to *G. myomphala* in color and texture, but much depressed and openly umbilicate, the columellar lip but slightly overhanging the umbilicus. Alt. 19, diam. 32, width of umbilicus 3 mm. Omikado, prov. Inaba (Mr. Y. Hirase). Specimens in the collection of Mr. Addison Gulick show that in true *myomphala* the umbilicus is not always wholly closed, but, unlike this variety, the columellar lip is flattened and spreading.

Ganesella Wiegmanniana n. sp. Shell deeply and (for the genus) openly umbilicate, much depressed, thick lens-shaped, angular at the periphery, encircled by a faint reddish-brown band above the periphery, surface somewhat glossy, sculptured with oblique growth-wrinkles, but without spiral striæ other than a few rather coarse, irregularly-developed spirals sometimes visible on the base. Spire low, convexly conoid; whorls $5\frac{1}{2}$, moderately convex, the last angular at the periphery, somewhat convex beneath, but slightly descending in front, more or less constricted behind the lip. Aperture oblique, irregularly lunate-oval, the peristome white, narrowly expanded, thickened within, the basal margin straightened, thickened or obsoletely toothed in the middle; columellar end dilated, slightly overhanging the umbilicus.

Alt. 11, diam. $18\frac{1}{2}$ to $20\frac{1}{2}$ mm.; width of umbilicus 2 mm.

Kochi, prov. Tosa (Y. Hirase).

This species is clearly distinct from the strongly carinated form of

G. japonica called *patruelis* or *tabuensis* by some authors, but which is probably not really that species. The much depressed form like a thick lens, the open umbilicus and want of spiral striæ are its more prominent features. It is named in honor of FRIEDRICH WIEGMANN, of Jena, author of numerous and valuable works on the anatomy of land snails.

A NEW LYROPECTEN.

BY W. H. DALL.¹

The group of Pectinidæ named by Conrad *Lyropecten*, of which *P. Heermanni* Conrad is the type, is known to have its precursors in the Oligocene, to be in its developed form characteristic of the Miocene of the Northern Hemisphere on both sides of the Atlantic, and to be represented in succeeding horizons only by degenerate types which can hardly be referred to the same section of the genus, though apparently descended from it.

The Pacific coast species hitherto known are *P. Heermanni* Conrad, 1855 (+ *P. estrellamum* Conrad, 1856, not 1857); *P. magnolia* Conrad, 1857 (+ *P. crassicardo* Conrad, 1862). The first mentioned is a species of moderate size with no analogue in the Atlantic Miocene; its exact horizon is still doubtful. The second, which corresponds in the West American fauna to *P. Jeffersonius* Say is found in the upper or San Pablo horizon of California. From the still newer (?) horizon of Rio Dell on the Eel River, California, Mr. J. S. Diller of the U. S. Geological Survey has obtained a new form of which this preliminary notice is given, not only as a new species of interest but as one of the largest species of *Pecten* yet known. It will be illustrated later in the Survey publications. It is the analogue of *P. Madisonius* Say.

Pecten (Lyropecten) Dilleri n. sp.

Shell large, rather compressed, nearly orbicular with a relatively short, straight hinge-line, dorsally rectangular, nearly smooth, subequal ears, the posterior with three small riblets; a well marked though shallow byssal fold; and moderately thick valves. The right valve is somewhat more convex and strongly sculptured, bear-

¹ By permission of the Director of the U. S. Geological Survey.

ing 29–30 high, narrow, T-rail-shaped ribs, flattened above, overhanging narrower, deep, nearly smooth channels; and with marked concentric imbrication, feeble on top of the ribs but articularly scaly at their sides. The sculpture of the left valve is less pronounced, hidden in the matrix, but apparently similar. Alt. 192, lat. 175, diam. about 35 mm. The lateral edges are slightly defective, the submargins very narrow.

GENERAL NOTES.

HOLOSPIRA MINIMA v. Martens.—In my opinion the northwest Mexican forms referred to *Holospira pfeifferi* by Crosse and Fischer and von Martens, are distinct from that central Mexican species; and as the varietal name *minor* is preoccupied (*H. teres* v. *minor*), the name *minima* of von Martens may be used.

Dr. von Martens describes var. *minima* as “dense tenuiter lamelloso-costata, length $11\frac{1}{2}$ mm. only, 4 in the largest diameter; aperture $2\frac{1}{2}$ mm.; whorls 11, distinctly convex; color reddish-yellow, the costæ white.” The locality was not known, but the figure shows the angular early whorls of the N. W. Mexican form described as a variety of *pfeifferi* by Fischer and Crosse, and I do not doubt that the type came from that region.

The shells collected at Hermosillo, Sonora, by Rémond, are larger, alt. $12\frac{1}{2}$ to $13\frac{1}{2}$, diam. of penult. whorl 4 mm. The riblets are rather stout and crowded, though not quite as wide as their intervals, and number 32 to 34 on the penultimate whorl. These ribs, or many of them, have the peculiarity so strongly developed in *Urocoptis elliotti* and some other species, of being hollow, and therefore easily broken down, showing only the edges of the two lateral laminae. There are $12\frac{1}{2}$ whorls, and the color is nearly uniform. The internal column is perfectly simple and the lumen of the whorls is free from folds or lamellæ of any sort.

Specimens sent by Mr. Fred L. Button, exact locality not given, are a little smaller, alt. $11\frac{1}{2}$ diam. above aperture 4 mm., have 11 to $11\frac{1}{2}$ whorls, and decidedly coarser ribs, 23 to 26 on the penultimate whorl.

Evidently the species is a variable one, and the varieties are probably local.

Tryon's figure of *H. pfeifferi* (Amer. Journ. of Conch. iii, pl. 15,

fig. 34) is a bad copy of Pfeiffer's figure of typical *H. pfeifferi* in the Conchylien Cabinet, pl. 6, f. 31; but the specimens before him were the N. W. Mexican form from near Hermosillo, collected by Rémond.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE FAMILY TELLINIDÆ AND OF THE NORTH AMERICAN SPECIES. By WILLIAM HEALEY DALL. Proc. U. S. Nat. Mus. vol. xxiii, pp. 285-326, 1900.

Some interesting notes on distribution and a list of the works referred to by dates in the text, is followed by a synopsis of the genera, subgenera and sections, an annotated list of the species, and description of new species, illustrated by three plates.

From the eastern coast are recorded: *Tellina interrupta* Wood, *T. laevigata* L., *T. lineata* Turt. (*T. brasiliiana* Lam.), *T. radiata* L., *T. crystallina* Wood, also on the Pacific coast. *T. lineata* Con., *T. æquistriata* Say, *T. americana* Dall (n. sp.), *T. fausta* Donovan, *T. alternata* Say, *T. angulosa* Gmel. (*T. punicea* Orb.), separated from pink var. of *alternata* by the pallial sinus reaching the anterior adductor scar. *T. georgiana* Dall (n. sp.). *T. squamifera* Desh., *T. Gouldii* Hanley, erroneously referred to the Pacific coast by author. *T. martinicensis* Orb., *T. magna* Spengl., *T. tenera* Say, *T. tenella* Verr., *T. texana* Dall (n. sp.), *T. versicolor* Cozzens, *T. sybaritica* Dall, *T. polita* Say,¹ *T. pauperata* Orb., *T. tanpaensis* Conr., *T. mera* Say, *T. promera* Dall (n. sp.), *T. simplex* Orb., *T. flagellum* Dall (n. sp.), *T. similis* Sowb. (*T. decora* Say), *T. iris* Say, *T. exilis* Lam., *T. candeana* Orb.; *Strigilla caruaria* L., *S. rombergii* Mörch, almost identical externally with the preceding, but the pallial sinus does not reach the anterior adductor scar. It seems to be more plentiful than *caruaria* on the Florida coast. *S. flexuosa* Say, and *pisiformis* L.; *Tellidora cristata* Recl. The left valve is the flatter; in *T. burnetti* Sowb. from the Pacific coast the reverse is the case. *Metis intastriata* Say; *Macoma constricta* Brug., *M. krausei* Dall. (n. sp.) *M. balthica* Linn., circumboreal, *M. calcarea* Gmel., also on the Pacific coast, *M. inflata* Stimp., *M. cerina* C. B. Ad. *M. leptonoidea* Dall, also on the Pacific. *M. mitchelli*

¹ This name being preoccupied, Dr. Dall has adopted the MSS. name of *Sayii*, proposed by Deshayes, see Trans. Wagner Inst., Vol. iii, pt. 5, p. 1034.

Dall, *M. phenax* Dall (n. sp.), *M. tenta* Say, *M. orientalis* Dall, *M. Tageliformis* Dall (n. sp.), *M. brevifrons* Say, *M. limulu* Dall, *M. extenuata* Dall (n. sp.).

The species of the western coast are: *Tellina cunningii* Hanley, *T. idæ* Dall, *T. lyra* Hanl., *T. lamellata* Cpr., *T. reclusa*, Dall. (n. sp.), *T. declivis* Sowb., *T. pacifica* Dall (n. sp.), *T. pristiphora* Dall (n. sp.), *T. rubescens* Hanl., *T. viridotincta* Cpr., *T. ochracea* Cpr., *T. broderipii* Desh., *T. cognata* C. B. Ads., *T. salmonea* Cpr., *T. merophis*. "This is the *T. gouldii* Cpr. 1865, not of Hanley 1846." *T. pazina* Dall (n. sp.), *T. amianta* Dall (n. sp.), *T. macneilii* Dall (n. sp.), *T. suffusus* Dall (n. sp.), *T. carpenteri* Dall, "This is the *variegatus* Cpr. 1864, not *variegata* Gmel. 1792," *T. cerrosiana* Dall (n. sp.), *T. recurva* Dall (n. sp.), *T. modesta* Cpr., *T. virgo* Hanley, *T. buttoni* Dall, "This is the var. *obtusum* Cpr. 1864, not *T. obtusa* Sowb. 1818." *T. lutea* Gray, *T. bodegensis* Hinds, *T. santarosæ* Dall (n. sp.), *Strigilla fucata* Gld., *S. sincera* Hanl., *S. cicerula* Phil., *S. lenticula* Phil., *Metis alta* Conr. "This is the *Scrobicularia biangulata* Cpr., and is also the *Lutricola alta* of the same author." *Macoma middendorffii* Dall, this is *M. edentula* Midd. 1851, not of Brod. & Sowb. 1839. *M. incongrua* v. Mart., *M. Kranseii* Dall. This is *Tellina lutea* Krause, 1885, not of Gray, 1828. *M. edentula* B. & S., *M. sitkana* Dall (n. sp.), *M. inflatula* Dall, *M. nasuta* Con., *M. carlottensis* Whiteaves, *M. liotricha* Dall, *M. expansa* Cpr., *M. yoldiformis* Cpr., *M. alaskana* Dall (n. sp.), *M. undulata* Hanl., *M. secta* Conr., *M. indentata* Cpr., and var. *tennirostris* Dall (n. v.), *M. elongata* Hanl., *M. panamensis* Dall (n. sp.), *M. aurora* Hanl.

TWO NEW CYPREIDÆ. By MRS. AGNES F. KENYON.—Proc. Mal. Soc. of London, vi, 68, Aug., 1900. *Cypræa kanilau* is a new species from the Hawaiian Islands. The description and figure seem very close to a large sized (28 mill.) *C. helvola* L.; specimens of this species from Hawaii differ considerably from those of the Indo-Pacific region. *Trivia acutisulcata* is described without habitat.

DESCRIPTION OF TWO SPECIES OF CYPRÆA, BOTH OF THE SUBGENUS TRIVIA. By JAMES COSMO MELVILL.—Annals and Magazine of Nat. Hist., Aug., 1900, p. 207. Both species were received from Mr. Fred L. Button. *C. (Trivia) galapagensis* from Albe-marle Isl., Galapagos, is a new peculiar form having a "shining enameled callosity over the whole centre of the dorsal region, completely obliterating the sulcus if any exists." *C. (Trivia) Buttoni* is a small globular straw-colored species with few, continuous ribs. Its habitat is unknown.



FOSSIL LAND SHELLS OF SAN NICOLAS ISLAND, CAL.

Figs. 1, *Helix tryonii*, vars. *major* and *minor* Hemph. Figs. 2, *Helix feralis* Hemph. Figs. 3, *Helix sodalis* Hemph. Figs. 4 a, *Succinea arava* Say.; b, *S. a. vermeta* Say.; c, *S. a. guadalupensis* Dall.

THE NAUTILUS.

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No. 11

A CONTRIBUTION TO WEST COAST CONCHOLOGY.

BY HENRY HEMPHILL.

Helix var. *feralis* Hemphill.

Shell imperforate, smooth, compact, globose, white (faded), consisting of five convex whorls, the last with an obscure band at the periphery, and slightly descending at the aperture; spire elevated, somewhat pointed; sutures well impressed; aperture oblique, cramped, not effuse, about as wide as high; peristome reflected, thickened, its face rounded, the basal portion in some of the specimens slightly appressed to the body, its terminations very little approached. Subfossil.

Diam. 18, alt. 13 mm.; diam. 16, alt. 11 mm.; diam. 15, alt. 11 mm.; diam. 10, alt. 8 mm.

Habitat: San Nicolas and Santa Barbara Islands.

The Santa Barbara Island specimens measure as follows: Diam. 15, alt. 10 mm.; diam. 14, alt. 9 mm.; diam. $12\frac{1}{2}$, alt. $7\frac{1}{2}$ mm.

This shell appears to be somewhat rare. Thirty-five specimens all told—good, bad and indifferent—were all I found in the week I had on San Nicolas Island, and about ten occurred on Santa Barbara Island.

The lot shows considerable variation in the elevation or depression of the spire, as well as in size, as will be seen by the measurements.

I regard it as a variety of the very variable *H. ruficincta* Newc., but perhaps the species-makers would be better pleased to call it distinct.

Helix var. *sodalis* Hemphill.

Shell umbilicated, very variable in size, white (faded), globosely depressed; whorls 5, the last flatly convex above and beneath, smooth, under a good pocket lens appearing very minutely granulated, falling slightly at the aperture; spire a little elevated, obtusely pointed; sutures distinct and moderately impressed; peristome roundly thickened and reflected, its terminations approached and joined by a thin callus, the basal one crowding the umbilicus; aperture subcircular, about as broad as high; umbilicus quite variable in width, showing a portion of the penultimate whorl in some of the specimens. Subfossil.

Diam. 14, alt. 8 mm.; diam. 12, alt. 6 mm.; diam. 10, alt. 5 mm.; diam. $8\frac{1}{2}$, alt. 4 mm.; diam. 7, alt. 4 mm.

Habitat: San Nicolas Island, California.

If this interesting little shell was found in Colorado, New Mexico, or along the eastern line of Arizona, it would very probably be called an *Ashmunella*; if it had been collected in the Ohio Valley it certainly would be called a *Polygyra*; but as it is found away out here on the western limits of the continent, conchologists will be highly delighted to call it *Epiphragmophora* (*Micrarionta*) *ruficincta sodalis* Hemph. Sometimes there is certainly a great deal (of length) in a name.

Besides the extreme variations in size, as shown by the measurements, the larger forms show about the same extremes in the width of the umbilicus. In the living state it must have been of about the same color as *H. ruficincta* Newc., as a few specimens retain the rufus-colored lip and a very faint trace of a peripheral revolving band.

At my request, Dr. Dall compared a series of this shell with his types of *H. guadalupiana*, and has kindly sent me the following notes on the differences of the two forms:

"The fossil helices are interesting. They are nearly related to the recent *catalinae*, and yet not quite the same. The large specimens of No. 3 from San Nicolas are nearest, but have a different shaped mouth, are more rounded at the periphery and rather more elevated. The small form of No. 3 seems to be the same as your No. 2, which are labeled *guadalupiana* var. *sodalis*. No. 1 is very near *guadalupiana* Dall, but more solid, more rounded and with the upper and lower lips on the body further apart than in the *guadalupiana* proper." "I regard *Gabbi* as distinct, as the umbilicus is

closed and the shell more compact; it is very close to *facta*.”
 “Doubtless all are branches of one stem.”

It will be seen by Dr. Dall's remarks that our shell stands closely related to his *catalinae* and *guadalupiana*, with very great differences in size, besides those he has pointed out, which entitle our shell to a name as a variety. As they are “doubtless all branches of one stem,” and as we have the stem in *Helix ruficincta* Newc., let us be consistent, follow nature, and call all of them branches (varieties) and not distinct stems.

Helix Tryonii major Hemph.

This variety is very much larger than any of the very many specimens that I have collected. One of the specimens is globosely depressed, with an effuse subcircular aperture and a prominent tubercle on the basal portion of the peristome near the termination of the columella. The peristome is thickened, not reflected, the ends not approaching, but they are joined by a heavy callus. The other specimen is narrower, with a conical elevated spire; the aperture is very oblique, laterally expanded, and wider than it is high; the peristome is greatly thickened near the columella, but without a tubercle, not reflected; the ends are very much approached, no perceptible callus joining them.

Diam. 30, alt. 23 mm.; diam. 27, alt. 26 mm.

Habitat: San Nicolas Island, Cal.; subfossil.

Helix Tryonii minor Hemph.

The shell is very much smaller than the types, and shows about the same differences in the elevation and depression of the spire and in the form of the aperture as var. *major*. There is no tubercle on the basal lip, which is very little thickened.

Diam. 17, alt. 13 mm.; diam. $16\frac{1}{2}$, alt. $13\frac{1}{2}$ mm.

Habitat: San Nicolas Island, Cal.; subfossil.

This small form is very close to *Helix* var. *feralis*.

Helix Tryonii maculata n. color-var.

Ground color ashy white, lighter beneath than above; the body whorl and spire speckled with darker spots, banded or bandless at the periphery, form variable in size; spire elevated or depressed.

Diam. 25, alt. 19 mm.; diam. 20, alt. $16\frac{1}{2}$ mm.; diam. 22, alt. 15 mm.

Habitat: Santa Barbara Island, Cal.

I now offer a complete list of the land shells, their varieties, and their range over these islands, as far as I know or have collected them myself, with the single exception of *Helix ayresiana*, from San Miguel Island :

Selenites Duranti Newc. Santa Barbara, San Clemente Islands.

Selenites Duranti catalinensis Hemph. Santa Catalina Island.

Zonites Shepardi Hemph. Santa Catalina Island.

Ariolimax columbianus stramineus Hemph. Santa Cruz Island.

Bimneya notabilis J. G. Cooper. Santa Barbara Island, recent and sub-fossil.

Helix ayresiana Newc. San Miguel, Santa Rosa, Santa Cruz Islands.

Helix intercisæ W. G. Binn., with varieties *minor* Hemph., *elegans* Hemph., *nepos* Hemph., *albida* Hemph. San Clemente Island.

Helix Tryonii Newc. Varieties *varius* Hemph., *nebulosa* Hemph., *fasciata* Hemph., *californica* Hemph., *albida* Hemph., *maculata* Hemph. Santa Barbara Island.

Helix Tryonii var. *major* Hemph., *minor* Hemph. San Nicolas Island.

Helix Tryonii var. *subcarinata* Hemph. Santa Barbara Island.

* * * * *

Helix ruficincta Newc. Santa Catalina Island.

Helix ruficincta feralis Hemph. San Nicolas, Santa Barbara Islands.

Helix ruficincta Gabbi Newc. Santa Catalina, San Clemente Islands.

Helix ruficincta facta Newc. Santa Barbara Island.

Helix ruficincta catalinæ Dall. Santa Catalina, Santa Barbara Island.

Helix ruficincta sodalis Hemph.

* * * * *

Helix kelletti Fbs. Varieties (a) *castaneus* Hemph., *nitidus* Hemph., *multilineata* Hemph., *frater* Hemph., *californica* Hemph., *Forbesii* Hemph., *bicolor* Hemph. Santa Catalina Island.

Helix kelletti var. *redimita* W. G. Binn., *hybrida* Hemph., (b) *castaneus* Hemph., *clementinæ* Dall. San Clemente Island.

Pupa clementina Sterki. San Clemente Island.

Pupa californica catalinaria Sterki. Santa Catalina Island.

Pupa californica elongata Sterki. San Clemente Island.

* * * * * * *

Succinea avara Say.

Succinea avara vermeta Say.

Succinea avara guadalupensis Dall.

Succinea avara oregonensis Lea.

Succinea avara rusticana Gld.

This completes the list of the land shells of these islands so far as I know them.

The above arrangement of the Succineas may not meet the approval of some conchologists, but these subfossils, as well as the recent forms, go through those successive changes in the development of the shell.

[*To be concluded.*]

A NEW SPECIES OF SUBEMARGINULA FROM CALIFORNIA.

BY W. H. DALL.

Subemarginula Yatesii n. sp.

Shell large, coarse, strong, whitish gray, or pale olive green on the fresher portions, especially a very narrow margin about the base; sculptured with strong, not dichotomous, radial ribs, of which about 20 are primary, between each two of which lie from one to four secondary riblets, most numerous at the sides of the shell; besides these there is a very strong anal fasciole, higher and stronger externally than any of the ribs, extending from the apex, and ending in front at a notch about 3.5 mm. deep and rounded above and behind; the radiating sculpture is sharply and irregularly imbricated by the rude and profuse incremental sculpture, which is too close and irregular to form reticulation; apex small, pointed, not much elevated, situated three-fifths of the way from the front to the posterior margin; the fasciole descending from it swerves a little to the right of the median line of the shell; interior white, the extreme margin pale olive green but almost linear; anal furrow deep, extending nearly to the apex, where it is lost in a very pale olive deposit of shelly matter; margins crenulated by the sculpture; muscular impressions strong, the two recurved scars unequal, the right one larger. Lon. of shell 51, lat. 36, alt. 13 mm.

This shell was received from Dr. L. G. Yates, of Santa Barbara,

who obtained it from a dealer at Monterey, Cal., who asserted it to have been obtained alive from the bay of Monterey. Two specimens were obtained, which the possessor would neither lend nor sell; but finally Dr. Yates succeeded in obtaining one of them, which he courteously forwarded to the National Museum for examination.

It can only be compared with *S. gigas* von Martens, of Japan, in which the furrow is obsolete, and there are no secondary ribs, and the primary ribs are feeble, low, wide, and obsolete on the anterior part of the shell. If the locality is confirmed, the species is a notable addition to the Californian fauna.

VARIATIONS IN ODOSTOMIA.

BY REV. HENRY W. WINKLEY.

The question is frequently asked, why do we not have an up to date work on New England shells? The answer can be made, but only by one who is in the work. New England shells are fascinating to study, very difficult to obtain and presenting curious resemblances. Much work has been done, but there remains considerable more before the small forms can be determined in such a way as to give a true list of species. Such genera as *Bela*, *Turbonilla* and *Odostomia* represent some of the problems of the New England fauna. During the past two years the writer has been located at Branford, Conn., and opportunity is thus afforded for consultation with Prof. Verrill and his assistant Miss Bush. These two have handled the great mass of materials dredged by the Fish Commission, and one would suppose all the fauna of New England would be exhausted. On careful examination of the writer's cabinet some half dozen new species have been detected—several of these are *Odostomias*. One is from Woods Holl, another from an isolated colony in Maine, one from Prince Edward's Island, etc. As these species will be described in due time by Prof. Verrill we will not anticipate his work. Other changes in the genus *Odostomia* will be noted by him, among them some based on the following facts which the writer has been led to observe. "Binney's Gould" gives the species *O. impressa*, *bisuturalis* and *trifida* as distinct species. Let us study the three. *O. impressa* from Florida is a thick, deeply grooved shell, and at first sight

appears as a very good species. Side by side with New England specimens there is practically no difference except in the thickness of the shell. That counts for nothing in determining a species. For example take New England *Purpura lapillus* and see the thin paper shell from one region and the heavy robust one from another locality. Add now *O. bisuturalis* and *trifida*. What determines the species? Revolving lines are interesting marks, but we have no standard, variety is everywhere. I take a few examples from my own cabinet; for convenience I will number the grooves from suture to the shoulder on the last whorl 1, 2, 3, 4. Here are some results:

Branford specimens vary thus: 1000-1004-1200-1204-1234.

Woods Holl: 1000-1004-1200-1204.

Sheepscote River, Maine: 0000-1000-1200-1234+.

Prince Edwards Island: 1000-1234+.

The plus sign means that additional lines appear, usually less conspicuous, between the more usual grooves. Perhaps this list may be altered, but I let it stand. There is so much difference, some deeply grooved while others are faintly marked. The above is the result of using a good lens and strong light across the lines. It looks as if these three species would have to shake hands and be one. I may add that the specimens from Maine and Prince Edward's Island are more deeply marked than the shells from southern New England.

NOTICES OF NEW JAPANESE LAND SNAILS.

BY HENRY A. PILSBRY.

Helicina osumiensis n. sp.

Shell depressed, convex above and below, bluntly angular at the periphery, rather thin, red; striatulate, and under a strong lens showing fine spiral striae. Spire low-conic, the apex obtuse; whorls 4, scarcely convex, the last somewhat flattened above the peripheral angle. Aperture oblique, irregularly semicircular, the peristome very slightly expanded, upper margin nearly straight; a moderately thick, smooth callus on the base. Alt. $2\frac{1}{2}$, diam. 4 mm.

Kikai, province Osumi, southern Kiusiu (Mr. Y. Hirase).

Closely related to *H. verecunda* Gould (*Otia Conchologia*, p. 105) from the Loo Choo Islands, but much smaller, with the basal callus smooth, not roughened or pitted as in that species.

H. verecunda is cream-white with reddish streaks, or red with or without whitish streaks; the color "*luteo-virens*" described by Gould being due to the dried animal which shows through in places with a dark green tint. The half dozen specimens of *H. osumiensis* before me are uniform red.

Mr. Y. Hirase has distributed *H. verecunda* as No. 470, from Loo Choo (Riu Kiu, or Ryu Kyu). The specimens agree with one of Gould's original lot, in the collection of the Academy. I suppose they are from Okinawa Island. So far, we know scarcely anything of the snail fauna of the other islands of the group. Recent subsidence and breaking up into islands, of a ridge running from Okinawa to Kiusiu is suggested by the close alliance of the southern Kiusiu and Loo Choo faunas.

The *Helicina hakodadiensis* of Hartman (1890) has been rediscovered by Mr. Hirase at Kayabe, Ojima, Hokkaido Id. (No. 595). It is quite a distinct species, more angular at the periphery than other Japanese forms, and with the ruddy color of *H. osumiensis* and the American *H. occulta*. *H. hakodadiensis* is, next to the last-named species, the northernmost of its genus, its locality lying in about 42° N. Lat., while *occulta* extends to about 44° N.

Helicina Reinii var. *uzenensis* n. var. Shell differing from *H. reinii* Kobelt in being larger, pink or whitish-pink under a yellowish chestnut-colored cuticle, which remains in shreds and streaks only, and in the closely and deeply striated surface. Alt. 12, diam. 15 to 16 mm. Nishigo, Uzen.

Vertigo Hirasei n. sp. A minute, ovate, glossy-brown species with $4\frac{1}{2}$ whorls, the aperture having a parietal and a columellar lamella, and two palatal folds, the lower larger, elongate, the upper tuberculiform, sometimes obsolete. Alt. 1.5, diam. 1 mm. Yanagawa, prov. Chikugo, Kiusiu Id. (Mr. Hirase, No. 570).

Buliminus callistoderma var. *ogasawaræ* n. v. Similar to *callistoderma* in texture, sculpture and color, but distinctly longer, with 7 whorls, the spire perceptibly attenuated below the thick, obtuse apex. Length 13, diam. $5\frac{1}{2}$, length of aperture 5 mm.; length $12\frac{1}{2}$, diam. $5\frac{1}{3}$, aperture $5\frac{1}{3}$ mill. Ogasawara or Bonin Is. (Mr. Y. Hirase, No. 602).

Buliminus eucharistus n. sp. Shell rimate, high-conic, solid, purplish-brown, closely streaked with whitish or yellow. Spire straightly conic, the apex obtuse; whorls $8\frac{1}{2}$ –9, moderately convex,

sculptured with growth-wrinkles and in places faint spiral striæ. Aperture slightly oblique, ovate, purplish-black within, the peristome white or flesh-colored, reflexed; parietal callus transparent; columella not perceptibly folded, oblique above, brown within. Length 26.5, diam. 11, length of aperture 10.3 mm.; 25.5, 11, 11 mm. Loo Choo Is. (Mr. Y. Hirase, No. 597). This is by all odds the handsomest Japanese *Buliminus*, being remarkably rich in color for the genus.

Buliminus luchuanus n. sp. Shell dextral, rimate, oblong-fusiform, rather thin, dark brown, copiously streaked with ragged cream-white stripes; obliquely wrinkle-striate and very minutely striated spirally. Outlines of the spire a little convex, apex obtuse, whorls $8\frac{1}{2}$, moderately convex. Aperture ovate, slightly oblique, orange-brown within, the peristome white, reflexed; columella oblique, the margin dilated; parietal callus transparent and thin. Length 21, diam. 7.5, length of aperture 8 mm. Loo Choo Is. (Mr. Y. Hirase, No. 598). Streaked like the sinistral Chinese *B. Fultoni* S. & B., or like *B. fasciolatus* Oliv., of Rhodes.

Eulota (Ægista) Martensiana n. sp. Somewhat similar to *E. Friedeliana*, but more elevated, the whorls larger in calibre, more slowly increasing, color darker, and sculpture stronger and more dense. Spire low-conic, whorls almost 7, convex, the last slightly carinate, shortly descending in front; sculpture rasp-like, consisting of *densely crowded*, short, erect scales, which are not shaggy. Umbilicus open, its width contained $3\frac{1}{2}$ times in that of the shell. Aperture oblique, subcircular, one-fourth excised by the parietal margin, lip narrowly reflexed, white. Alt. $10\frac{1}{2}$, diam. $17\frac{1}{2}$ mm. Sedake, Osumi, Kiusiu Id. (Mr. Y. Hirase). Named in honor of Prof. E. von MARTENS, of Berlin, whose wide-spread labors include several valuable papers upon the mollusks of Japan.

Eulota (Plectotropis) inornata n. sp. Shell umbilicate, the diam. of umbilicus contained about 6 times in that of the shell, low conoid with convex base, thin, somewhat translucent, pale corneous, sculptured with slight growth-wrinkles and fine, close spiral striæ. Whorls $5\frac{2}{3}$, somewhat convex, the last with an acute, submarginate, smooth, peripheral carina; hardly descending in front. Aperture oblique, angular, the peristome thin, very narrowly expanded and subreflexed below, dilated at the columellar insertion. Alt. 6.3, diam. 12.5 mm. Loo Choo Is. (Mr. Y. Hirase).

GENERAL NOTES.

VALLONIA PULCHELLA.—You may remember that in '97 I sent you a note concerning the sudden appearance of *Vallonia pulchella* in immense numbers in Pittsburg, Pa. A similar case has just been brought to my attention by a friend who lives about 6 miles out of town. Sometime in September he found his front walk (stone) covered with "thousands of small shells," and about two weeks later they appeared again. He saved a few for me and they prove to be *Vallonia pulchella*. Are such occurrences common?—G. H. CLAPP.

AN ADDITION TO THE U. S. LAND SNAIL FAUNA.—For the past three years I have had three adult and three young examples of a *Truncatella* from Key West, Fla., collected by Hemphill, which I had labeled, provisionally, *T. bilabiata* (they were sent as "*T. pulchella* var."), but which I was satisfied, from the very coarse and widely-spaced ribs, were something else. Your Bermuda paper has put me on the right track, as they agree *perfectly* with the "key" to and figure of *Truncatella clathrus* Lowe, so we must add this species to the U. S. fauna.—G. H. CLAPP.

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE NAIADES, OR PEARLY FRESH-WATER MUSSELS. By Charles Torrey Simpson. viii + 544 pp. (Proc. U. S. Nat. Mus. xxii, 1900.) This work presents an epitome of the author's studies during many years upon the *classification* of the fresh-water mussels, the *synonymy of the species*, and their *geographic distribution*. It is, in fact, a continuation of the famous series of synopses issued by ISAAC LEA; an *arrangement* of the mussels, not a work for the determination of species.

The classification of the family *Unionidæ* is almost completely original with Mr. Simpson, and it need not be said, must appear strange to those acquainted with the old arrangement of the group. The treatment of *Mutelidæ* is less revolutionary. The fundamental division of the *Unionidæ* rests upon the modifications of the ovisacs, or modified gill pouches of the female carrying the embryos; the sculpture of the beaks of the shell also affording characters of great value, being shown to be correlated with features of the soft anatomy.

Some 63 genera are recognized in the *Unionidæ*, over two-thirds of them being formed from the old genus *Unio* of authors, while *Margaritana* has also been dismembered. *Anodonta* is retained in nearly its old limits, except that the South American forms have been transferred to the genus *Glabaris* of the *Mutelidæ*, a change made by Dr. von Ihering some years ago. While a large portion of the genera are based upon the peculiarities of the ovisacs or other internal organs, Mr. Simpson finds that "when these are once discovered and understood, it will be found on careful examination that there are minor shell characters that correspond with those of the marsupia" so that a vast number of species unknown anatomically can be correctly grouped generically by the shells alone, although in some cases the record is not thus easily to be read. This is about the way the case stands in the *Helicidæ*; and in fact tallies with conclusions reached by workers on widely diverse groups of mollusks. The people who decry "mere shell characters" as valueless, are those who know little about them; but the fact remains that without knowledge of the internal anatomy, the real significance and comparative value of the shell characters could never have been discovered. Practical conchologists should give Mr. Simpson's system the test of rearranging their species by it. We hazard little in saying that once this is done, the naturalness of his generic groups will win general acceptance for the new classification. In many cases one cannot but be struck by the happy grouping of species which never before seemed to fit in anywhere.

Regarding the synonymy, Mr. Simpson seems to have exercised fair and temperate judgment. He is no species-splitter, but on the other hand, he has steered clear of an equally dangerous reef, which has wrecked several promising investigators. In other words, he has never allowed the reaction toward extreme "lumping" of species, which followed the era of Lea, to warp his judgment. As it is, the list of synonyms under some species, such as *Unio complanatus*, *tuomeyi*, *obesus*, etc., is appalling. The treatment of the *Lampsilis parvus* group is particularly commendable.

In the geographic relationships of the genera, a close affinity between the groups of southeastern Asia and tropical Africa is stated to obtain. This accords with the distribution of *Ampullariidæ*, *Viviparidæ*, and many land shells such as *Zonitidæ* and *Streptaxidæ*. The faunal relation between the mollusks of eastern Asia and

America, so conspicuous in land snails, also seems to hold in *Unionidæ*. The discussion of the dispersal and migration of the *Unionidæ* is one of the most interesting chapters. Mr. Simpson believes that the earliest Uniones had radial beak sculpture and carried the embryos in the inner gills; but these characters now persist chiefly in austral species, such as the South American genera (*Hyriariæ*) which have been replaced in the north by forms with external ovisacs and concentric beak sculpture (*Unioninæ*). The genus *Truncilla* ("*Unio triangularis*," etc.) marks the highest differentiation of Naiad life. Space denies further discussion of this topic, which, though highly theoretical, is handled with firm grasp of the facts and probabilities in the case.

Mr. Simpson's synopsis is destined to work a revolution in the study of fresh-water mussels, though there will naturally be opposition to the new ideas and methods among some reactionists. It is to be hoped that a sufficient edition has been prepared to enable all interested in the subject to obtain copies, and that a way will be opened for Mr. Simpson to continue his work to its logical end in a fully illustrated monograph of the "naiades."

FRANCIS C. BROWNE.

It was only recently that the editors of THE NAUTILUS learned with regret of the death of one of their old correspondents, Francis C. Browne, which occurred at his home in Framingham, Mass., Jan. 9, 1900, in the 70th year of his age.

He graduated from Harvard College in 1851, and the same year went to Florida, where he joined Prof. Agassiz's party at Key West. He camped in the Everglades and upon the Miami River, and secured many rare and valuable specimens. Later he visited Labrador and obtained many rare specimens of birds. For several years Mr. Browne would frequently send us boxes of shells for verification or determination, and his enthusiasm and appreciation made the work always a pleasure. He was also a devoted lover of birds, being an associate member of the American Ornithologists' Union and an occasional contributor to "The Auk" and "Nuttall Bulletin."

He leaves a daughter, to whom we are indebted for the facts of this brief sketch.

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DESCRIPTION OF TWO NEW SPECIES OF GLANDINA FROM JAMAICA.

BY HENRY VENDRYES.

Glandina (Varicella) Taylora, n. sp. Fig. 1.

Shell much elongated, oblong-fusiform. Not very shining, often semi-pellucid, of a brown color, deeply-tinted with rose orange; with narrow dark, reddish-hued or chestnut transverse streaks, crossing completely over all the whorls but not always extending to the base of the last whorl, but always coincident with and bordering the varices, of which there are four to five upon each whorl. Shell sculptured with fine transverse striæ, which become more apparent on the upper shoulder of the body whorl, next to the suture. Whorls 7, slightly convex, but in most cases perceptibly flattened or constricted at the periphery; the last whorl more than one-half the entire length of the shell. Suture impressed, the edge somewhat crenulated at one margin by the intrusion of the transverse striæ. Spire with the outlines somewhat curvilinear, rather pointed at the summit. Aperture not large, semi-ovate; labrum sharp, slightly produced towards the middle and below that point, gradually retreating, expanding and rounding off to meet the twisted, arcuated and obliquely truncate columella. Length 23 to 25, greatest diam. 7, or slightly less. Length of aperture 9, largest diam. 4 mill.

Habitat: Half Way Tree Pen, Parish of St. Catherine, Jamaica.

This shell resembles *G. nemorensis* in form but is considerably larger. In the outline of the spire it comes between *G. nemorensis* and *G. similis*, but it is larger than either of these species. The

FIG. 1.



strigæ are slightly broader than in *nemorensis* and not nearly so broad as in *similis*. In color it differs from both.

The shell is named in honor of Mr. C. B. Taylor, well known for his work on the birds and for his attainments in the general natural history of Jamaica, and by whom the species was first collected.

Glandina (Varicella) deflorescens, n. sp. Fig. 2.

Shell elongated, sub-fusiform, turreted, shining; color rather pale brown, generally with dark chestnut-brown, somewhat arcuated streaks, a set of which run coincidently with the varices completely across each whorl. The painting of the shell is singularly varied; each successive whorl presents at the start a semi-transparent, sharply-defined and pure white stripe, which gradually passes into pale brown, then slowly deepens in color as the whorl progresses, into a warmer tint and finally merges into an intensely dark-brown stripe, covering the varix forward, which varix marks the termination of a stage of growth. This gradually changing color scheme is always repeated between the several varices, but it is less noticeable upon the upper part of the spire, although actually traceable almost to the apex. Shell regularly sculptured with not very crowded rib-like striae. Whorls 8, very slightly convex and obsoletely angular just below the upper margin, which is crenulated by the passing over of the striae. Suture moderately impressed. Last whorl a little more than one-third the entire length. Outline of spire slightly curvilinear; apex pointed. Aperture ovate, oblong, considerably dilated at right side of base; labrum not sharp. Columella white, straight, well truncated with a strong callosity deeply impressed and folded by the entering striae and varices which pass to and over it from the shell.



Total length, 17 to 18½ mill., diam. 5. Length of aperture 6, diam. 2 mill.

This remarkable species is named in allusion to the singular character of its painting. I am indebted for examples to Mr. P. W. Jarvis, who received them from Mr. Geo. Nutt, by whom they were for the first time collected at Moore-Town in the Parish of Portland, Jamaica.

The peculiarities of the columellar callus, impressed with the

marks of the sculpture of the shell, and of the dilation of part of the labrum on the right side of the base of the aperture, allies this species with *Glandina leucozonias* and *dominicensis*, both of which occur in the Parish of Portland in the extreme eastern part of the island.

POLYGYRA STENOTREMA WITHOUT A LIP-NOTCH.

BY HENRY A. PILSBRY.

Mr. Bryant Walker has sent me for examination a specimen agreeing with *Polygyra stenotrema* in the main, except that the basal lip is without the usual median nick or notch. The parietal lamella is strong and high, as usual in the species. Form rather elevated. Alt. slightly over 6, diam. 8.7 mm. It was taken by Mr. Walker at Dalton, Georgia; being the only *stenotrema* collected at that place.

In the collection of Mr. Geo. H. Clapp are two specimens, formerly in the James Lewis collection, labeled "East Tennessee," which agree with Mr. Walker's Georgia shell in lacking the lip-notch, although in one a slight wide sinuation of the lip in place of it, is perceptible. They measure 8 and 8.5 mm. diam., one with high, the other moderately low spire. All of the specimens show hairs or their traces, as in *P. stenotrema*, though not very conspicuously.

The lip-notch in the *stenotrema* species corresponds of course to the space between the lip-teeth in *Tridopsis*, the thickened ledges on each side of the notch being homologous with the basal and outer teeth in such species as *P. tridentata*. These notchless shells therefore represent cases of confluence or concrescence of teeth, a somewhat rare occurrence in Helices.

The question arises, are these shells merely abnormal forms produced by some mantle injury or other abnormal condition, or do they represent a rare race of which the notchless lip is characteristic? The former alternative seems most probable, except that the shell and lip seem quite without trace of any evidence of a diseased condition of the mantle, which is usually manifested by some roughness in the deposition of lime at the lip, or irregularity in the cuticle behind it.

However, the question is not one to be decided off-hand, but by the examination of more material; and I would ask collectors to go over their specimens of *P. stenotrema* and allied species, and report

full results to THE NAUTILUS. Locality of specimens and number examined from each locality should be given, as well as the occurrence of specimens without the notch. Any other notable variation might also be noticed; and negative results, so far as regards the matter of the notch, will be useful. The entire results can then be collated and published in THE NAUTILUS.

A CONTRIBUTION TO WEST COAST CONCHOLOGY.—*Continued.*

BY HENRY HEMPHILL.

As the original locality, "Santa Barbara," given for *Helix kelletti*, Fbs., is undoubtedly a mistake, some writers on our land shells have referred that shell to Santa Barbara island, which is equally as erroneous. Santa Barbara island is about one or one and one-half miles long and perhaps one mile wide, and quite easy of exploration. On my first visit to it, 25 years ago, I was left there alone for seven days, while the vessel went to San Pedro to be cleaned and repaired. During that time I explored every part of the island, collecting the land shells, which was the especial object of my visit. Last August I made another visit to that island for the same purpose, and gave four days more to collecting the land shells, and during these eleven days not a single specimen of *Helix kelletti* was found, and as dead *Helix tryonii* may be picked up by the thousands, and as no shell of that description was mentioned in Forbes' report of the "Herald and Pandora" surveying expedition or voyage, during which time the original *kelletti* was collected, we may reasonably suppose that the vessels of that expedition did not even visit Santa Barbara island.

It is quite interesting and instructive to note the various opinions that have been expressed from time to time by distinguished conchologists on this matter. In the Am. Jour. of Conch., vol. 4, pl. 4, p. 214, 1868, Dr. J. G. Cooper writes: "Kellett's specimens were probably from one of the small islands off the coast of the peninsula (Lower Cal., II. H.), though credited to "Central America," and were a dwarfed form, the species attaining its highest development on Catalina island, within this state (Cal., H. H.), not Santa Barbara island, as stated by Newcomb, where *tryonii* replaces it."

"Prof. A. Wood found specimens on the summit of a mountain twelve miles east of San Diego, and at one or two thousand feet ele-

vation, which although much smaller were finely colored, more like the original type, or like Mr. Gabb's *stearnsiana*."

In his Manual of American Land Shells, p. 150, Mr. W. G. Binney credits *H. kelletti* Fbs. to San Diego, Santa Catalina Island, San Nicolas Island in the California region; "also 12 miles east of San Diego at 2000 feet elevation," and remarks, "The specimen figured is from Catalina Island. I am positive it is correctly referred to *kelletti*." "Forbes' original figure is copied in Terr. Moll., V." On turning to Terr. Moll. v., I find the figure identical with the one in his Manual, on page 149, which is undoubtedly the Catalina Island form. I may add here that I found no specimens of *H. kelletti* on San Nicolas Island, but my time and operations were limited while there to the south end of that island.

In a paper published in the Proceedings of the Academy Nat. Sciences of Philadelphia, 1900, entitled, "Additions to the Insular Land-Shell Faunas of the Pacific Coast," etc. Dr. Dall writes of *H. kelletti*, "the typical *E. kelletti* is that found in the vicinity of San Diego. It has six whorls and they are well rounded. It differs from the Catalina Island form, in its less flattened and more inflated whorls, more dome-like spire, smaller size and browner aspect, the contrast between the upper and lower sides of the last whorl being less marked. Specimens from Coronado Islands are like those from San Diego. The National Museum has this species only from the above-mentioned three localities authentically. "Santa Barbara," frequently mentioned as a locality, should read "Santa Barbara Islands," as it is improbable that the shell occurs at the town of Santa Barbara on the mainland. A lot in the National Museum are labelled, "Oregon City," Shumard, which is, of course, an error.

If the San Diego and Coronado Islands forms are accepted as the typical *H. kelletti* Fbs., as suggested by Dr. Dall, then *H. stearnsiana* Gabb. must fall into the synonymy of that species, notwithstanding the former is said to have six, and the latter five whorls; and then the Catalina Island form would be undescribed or rather unnamed. Some of the Catalina specimens are an exact imitation of San Diego and Coronado Island examples in coloring, as well as in size. *H. stearnsiana*, at Santo Tomas, and on Todas Santos Islands, lower California, attains a greater size than any specimens of *H. kelletti* that I have ever seen, and associated with them individuals occur as small as the San Diego or Coronado Island forms.

Mr. R. E. C. Stearns, in his usual thorough manner, ventilates this matter of the locality of *H. kelletti* in a paper published in the Annals of the New York Academy of Sciences, May, 1881, entitled, "*Helix aspersa* in California." He quotes the following from Dr. Carpenter's Report on the Mollusks of the West Coast of North America. "Among the wasted opportunities of obtaining very valuable information on geographical distribution must unfortunately be recorded the surveying voyage of the Herald and Pandora, Capt. Kellett, R. N. C. B., and Lieut. Wood, R. N."

"Here was an exploration in competent hands on the very incognita itself; and yet, alas! Prof. E. Forbes further states that unfortunately the precise locality of many of the individual specimens had not been noticed at the time, and a quantity of Polynesian shells mingled with them have tended to render the value of the collection, as illustrative of distribution, less exact than it might have been."

The following also from Dr. Carpenter's report refers to the locality of some of the land shells:

"*Helix pandoræ* Forbes. Santa Barbara, as per box-label. San Juan del Fuaco, teste Forbes.

"—— *kelletti* Fbs. Allied to *H. californiensis* Lea, same locality.

"—— *aspersa*. Marked Santa Barbara, probably imported."

To the above Dr. Stearns pertinantly remarks: "The closing line of Dr. Carpenter hardly justifies the previous remark, 'an exploration in competent hands.'"

Dr. Stearns further remarks: "Binney, in the volume quoted, properly credits *H. pandoræ* to 'Margarita Bay, Lower California.' Forbes' habitat of this species is only seventeen hundred miles too far north, and of *kelletti*, eleven hundred."

"Another distinguished author has placed the Lower Californian *Helix levis* on the Columbia River—about fifteen hundred miles too near the north pole."

As *Helix stearnsiana* Gabb is so closely related to *H. kelletti* Fbs., I will add the following:

Mr. Binney, in the Manual Am. Land Shells, says of *H. stearnsiana*: It has 5 whorls, the measurements are given as, greater diam. 22, lesser 17 mm., height 12 mm. Tryon, in his Manual Conchology, writes, whorls 5, diam. 22 mm.

Mr. Gabb describes the shell in the Am. Jour. Conch. as having

$5\frac{1}{2}$ whorls, gives no measurements, and remarks: "As compared with *H. kelletti* Fbs., this shell has not the peculiar flat sloping top to the whorls so characteristic of Forbes' species, the mouth is much less oblique, the umbilicus is not covered, nor are the ends of the lip connected by either callus or plate over the body whorl. I have made minute comparisons of a large series of the present species, with specimens in the collection of Dr. Newcomb labeled *Kelletti* Fbs., and sent to him by Hugh Cuming."

"Another point of difference is the locality. Forbes' species has never been found farther south than San Diego, and its true habitat is probably on one of the islands of the coast, while our species is essentially a Lower Californian, being found under stumps of Maguey from St. Tomas to a little beyond Rosario."

I may add here that the form we call *stearnsiana* is very variable in size, though quite constant in general coloring. To show these variations in size I add the measurements of two specimens I collected myself at Santo Tomas, in Lower California, Gabb's original locality. The largest measures, great diam. 31, alt. 23 mm.; smallest specimen, great diam. 22, alt. 16 mm.

I have quoted from these eminent conchologists not only to show how much they differ in their opinions about the locality and form of *H. kelletti*, Fbs., and *Helix stearnsiana*, Gabb, but because their writings have become a part of the history of this shell (*H. kelletti*) "without a country."

One fact is sure, the exact locality of *H. kelletti*, Fbs., is lost, and suppositions, probabilities and surmises count for nothing in this case.

As Catalina Island is the nearest point to Santa Barbara, one of Forbes' localities for *kelletti*, where that shell is known to exist, and as it has been largely distributed as the typical form, I think it will be wise to let it remain so, and not attempt any change. If we make the San Diego shell the typical *kelletti*, then *stearnsiana* must fall into the synonymy of that species, for no one with a good series of these shells to study from can by any character whatever separate them. Even some of the Catalina Island shells are an exact imitation in general coloring of the San Diego and Coronada Island *stearnsiana*, and with the same number of whorls.

While upon this chapter of errors, blunders and mistakes, I will call attention to such expressions as the following that occasionally appear in print: "Californian conchologists call such a shell 'so and

so.'” “West Coast conchologists are in error,” etc., etc. One esteemed correspondent quite recently wrote me, “Some West Coast conchologists are a little mixed.” When we understand that most all West Coast conchologists have depended on the “Wise men of the East” for the names and all that pertains to the study of conchology, and that many of their mistakes are simply a reflection back to the East of the blunders that have been sent out to the West by Easterners, we can see just where the smile comes in. My own experience of thirty-five years “on these lines” has two sides to it, one very pleasant and the other very exasperating. I fear there have gone out of my shell den some expressions for which I cannot be held responsible, for in my way of thinking the provocation has been very great.

The fact is we all make blunders and mistakes, and West Coast conchologists do their share; but when we follow monographs published by Eastern conchologists that contain mistakes, and when we depend on Eastern conchologists for the names, and many of these names prove to be erroneous, it seems hardly fair to refer to West Coasters in such a way that those who do not know all the facts would think that West Coast conchologists were nothing but a lot of blunderers. “Wise men of the East,” please take a rest, and pick the beam out of your own eye!

NEW NORTH AMERICAN SPHÆRIA.

BY DR. V. STERKI.

During the last seven years I had chances to examine tens of thousands of Sphæria and Calyculinæ, alongside with the Pisidia, owing to the efforts and the kindness of many conchologists and partly to my own collecting. Yet I refrained from publishing anything on the subject before I should have acquired some knowledge about the range of variation of the several species, almost endless in some instances. There are some new forms, however, so very different from those published that they must be named and described.

Sphærium crassum, n. sp. Mussel large, strongly inflated, almost equipartite, somewhat rhomboidal in perpendicular outline; beaks a little anterior, large and full, slightly flattened on top, prominent over the hinge line; superior margin rather strongly, inferior mod-

erately curved; scutum and scutellum distinct with slight projecting, rounded angles at their terminations, the one at the scutum being less marked in full-grown specimens; anterior and posterior ends almost equally, obliquely truncated, especially in specimens not quite mature, while in the adult the posterior end forms more a regular curve from the beaks down to the rather low-situated rounded end; surface with rather sharp, fine and crowded sulcations, usually somewhat coarser on the beaks, dull or with a slight gloss; a few strongly marked lines of growth; color grayish or whitish-brown in the young, and the same in slightly marked marginal zones of older specimens plumbeous in half grown, and reddish or brownish, or smoky-brown, in the adult, with narrow, darker zones on the lines of growth; shell thick, muscle insertions distinct, nacre white, almost porcellaneous, with bluish zones corresponding with the lines of growth; hinge strong, plate rather broad, cardinal teeth comparatively large, the right strongly curved, emarginate at the free edge, its posterior part thick, slightly to deeply grooved; the inferior in the left valve short, curved, the superior shorter to longer than the inferior, moderately posterior, oblique, little curved; lateral teeth strong, those of the left valve with very high pointed cusps, ligament rather large, covered.

Size: long. 15, alt. 11.5, diam. 9.5 mill.

Long. 14, alt. 11.5, diam. 9 mill.

Habitat: Carp Lake, near Mackinaw City, Michigan, collected by Mr. Bryant Walker.

This is a remarkable *Sphaerium*. It stands near some large forms of *stamineum*, yet by its shape, large diameter and very large beaks, is different; *S. solidulum* is more rounded in its outlines, less inflated, its beaks are smaller, and the sulcation is coarser. In its surface appearance, sulcation and color, our species resembles *S. simile*, but is much shorter, comparatively, its beaks are higher, the hinge margin is more curved and the hinge very much stronger.

Sphaerium walkeri n. sp. Mussel small, well inflated, almost equipartite; beaks little anterior, rather broad, rounded, not high, somewhat projecting over the hinge margin; the latter rather short, little curved; scutum and scutellum scarcely marked, with slight, projecting rounded angles; inferior margin slightly curved; anterior end well rounded, passing into the inferior without any indication of an angle; posterior slightly truncated obliquely, passing into the inferior with a low situated, rounded angle; surface with very fine, some-

what irregular striation, also on top of the beaks, shining; color yellowish to brownish horn; shell thin; translucent; muscle insertions slightly marked; hinge rather short, slightly curved, fine, plate narrow; the right cardinal tooth little curved or almost straight, thin; the left inferior, short, slightly curved, the superior longer, rather posterior and curved down at the posterior end; lateral teeth fine, the outer ones in the right valve quite small, those in the left valve with short sharp cusps; ligament small.

Size: long. 5.3, alt. 4.5, diam. 3.4 mill. (largest specimen, long. 4.6, alt. 4, diam. 3.2 mill. and probably full grown.)

Habitat: Lake Michigan, off New York Point, in deep water, dredged by Mr. Bryant Walker, at 24 meters.

The present *Spharium* ranges under the group *Corneola*, with *Sph. rhomboideum* Say and *occidentale* Pr., but is quite distinct from both, not only by its small size; from the former it is distinguished by its well-rounded anterior part, from the latter, by its broader, less prominent beaks and the oblique posterior end. It has some resemblance, in shape, with some forms of *Sph. corneum* Lin. of Europe, but is very much smaller, its beaks are somewhat different and so is the surface appearance.

The specimens were first seen in November, 1894, and then regarded as representing a new species, and named in honor of Mr. Bryant Walker, the indefatigable scientist and collector to whom we owe so much conchological knowledge.

A NEW PINNA FROM CALIFORNIA.

BY WM. H. DALL.

No species of the *Pinnidæ* has hitherto been known from California, or reported from any point more northerly than the Gulf of California on the Pacific coast. It was therefore a surprise when I received from Mr. and Mrs. Oldroyd a specimen taken alive by fishermen in 25 fathoms, San Pedro Bay. This is rather an exceptional depth for a species of its solid and heavy character, the deep water *Pinnidæ* usually belonging to the small, delicate and spinose forms, and the coarse imbricate species being more commonly found gregariously, at no great distance below low water mark, where their sharp edges have often been referred to as injurious to small boats landing in the shallow water. The present form belongs to the genus

Atrina, characterized by the absence of any slit in the umbonal part of the shell, such as is found in all the typical *Pinnas*.

Atrina oldroydii n. sp.

Shell solid, heavy, blackish-gray, subtriangular, rather inflated; umbonal end slender (somewhat defective in the specimen); hinge margin straight; ventral margin contracted in front, convexly arcuate behind; posterior margin arched; exterior smooth, except for more or less concentric wrinkling on the ventral side and numerous rather fine imbricate elevated ridges (about 38) radiating from near the umbo on the dorsal and middle portions of the valve, not extending to the ventral surface and obsolete over the distal fourth of the valve; the scales or spines are worn off, but appear to have been numerous and small; interior of a livid dark olive gray, with a lurid iridescence over the visceral area, the ventral edge of which extends in a zigzag line almost directly anterior from the ventral edge of the rather small adductor scar, leaving more than a third of the ventral surface of the inside of the valve exterior to the visceral area. Length of ventral margin 238; of dorsal margin 175; of the distal margin 156; maximum diameter of the valves 63 mm. Length of the visceral area from the umbo 172 mm. The byssus is quite small and of a dark blackish-brown color.

The form of the visceral area, which in these shells is generally regarded as a pretty constant character, is entirely different from that of any of the other described Pacific coast species. In the form which, as described, comes nearest to *A. oldroydii* (*A. tuberculosa*), has the posterior margin of the visceral area forming a straight line from the dorsal nearly to the ventral margin of the valves.

The present species appears to be an analogue of our Atlantic coast *A. serrata* Sowerby, but as regards the exterior characters probably submits to a variation which only the study of a larger number of specimens will enable us to determine.

Though not a particularly handsome shell, this is one of the most notable among the many additions made to the mollusk fauna of California in recent years.

ALASMODONTA MARGINATA, SAY, AND A. TRUNCATA, WRIGHT.
—In his "Synopsis of the Naiades," Mr. Simpson says the former is from "Lower St. Lawrence, southward in streams draining into the

Atlantic to South Carolina;" the latter, "Upper Mississippi drainage, Ohio, Cumberland and Tennessee systems; Michigan, Upper St. Lawrence drainage."

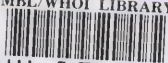
In his description (Jour. Acad. Nat. Sci., I., p. 459) Mr. Say gives the Scioto river as the locality of the types of "*Alasmodonta marginata*," and states that the types are in the Academy collection. There is one good specimen in the collection of the Academy, of the *truncata* species, labeled *A. marginata*, Say, from the Scioto river. Mr. Say must have been familiar with the eastern form. Did he decide to change the name of the western truncate form to "*truncata*" and let "*marginata*" cover the eastern form? Probably no one living can answer this question, but we can imagine it answered in the affirmative, and label the Atlantic slope shell "*marginata*, Say," and the Ohio shell "*truncata*, Wright," in accord with Mr. Simpson's magnificent synopsis.—CHARLES LEROY WHEELER.

GENERAL NOTES.

TRIVIA PAUCILIRATA Sowb.—Some months ago, upon looking over some small shells labeled "Sarasota Bay," which have been for many years in my collection, unidentified and collector unknown, I noticed a very small *Trivia* which seemed to correspond to Sowerby's description of *T. paucilirata*, a well-marked species. Upon sending it to Mr. Melvill, he has confirmed my opinion and pronounces it an undoubted representative of that species, the habitat of which seems to have been hitherto unknown, at least so far as the monographs would indicate.—FRED L. BUTTON.

EPIPHRAGMOPHORA FIDELIS (GRAY) IN CENTRAL CALIFORNIA.—During a short yachting cruise south, on San Francisco Bay, we anchored during the night of Feb. 16, 1901, at Point San Mateo, San Mateo Co. As it rained quite heavily during the night I anticipated that snails would be out in force on the heavily wooded slope of the point, so landed for a hunt in the morning. I saw under the eucalyptus and pine trees hundreds of specimens of *Epiphragmophora arrosa* Gld., *Epiphragmophora californiensis nickliniana* Lea, and *Circinaria rancouverensis* Lea, of which I secured numerous fine specimens. I also found, to my great surprise, two fine specimens of *Epiphragmophora fidelis* Gray, hitherto recorded as being found from Humboldt and Shasta Cos., Cal. to Vancouver Island.—EDWARD W. GIFFORD.

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